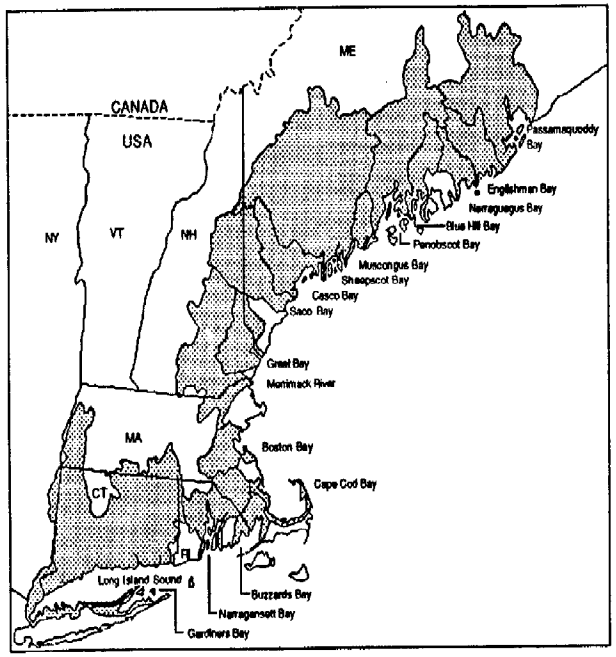
Strategic Assessment Of Near Coastal Waters

Northeast Case Study



EPA/NOAA Team
on Near Coastal Waters

November 1987
(Interim Draft)

Contents

EPA/NOAA Team on Near Coastal Waters

Introduction

This is an interim draft of a forthcoming case study report of coastal and estuarine information for 17 estuaries of the Northeast USA. It illustrates the progress made toward completion of the final report since the September 1987 preliminary draft.

In 1987, the Environmental Protection Agency (EPA) developed a Strategic Initiative for the Management of Near Coastal Waters. As part of this initiative, the states and EPA are to identify estuarine and coastal waters that require management attention. Using available information, state and EPA managers must begin evaluating the present environmental status and future trends in near coastal waters of the USA.

Beginning in June, EPA and the National Oceanic and Atmospheric Administration (NOAA) initiated this case study to illustrate the types of data that are available, or that soon will be available, for resource assessments of estuaries and near coastal waters throughout the contiguous USA. Most of the information presented is compiled from data bases developed by NOAA's continuing program of strategic assessments, including its *National Coastal Pollutant Discharge Inventory, National Estuarine Inventory, National Coastal Wetlands Inventory,* and *Public Outdoor Recreational Facilities Inventory.*

Information is being compiled and organized for seven sections: (1) physical and hydrologic characteristics; (2) land use and population; (3) nutrient discharges to estuaries; (4) classified shellfish waters; (5) toxic discharges to estuaries and hazardous waste disposal sites; (6) coastal wetlands; and (7) public outdoor recreation facilities. In this draft, the fifth section, Toxic Discharges to Estuaries and Hazardous Waste Disposal Sites, has been completed to illustrate the approximate scale and scope of the information content and discussion that will be presented for each theme in the final report.

Most of the information is organized by estuarine drainage area (EDA), the land and water component of an entire watershed that most directly affects an estuary. For some estuaries, this may represent an entire watershed; for others, it is a part of the watershed. The study area of this report includes EDAs for each of the 17 estuaries (Figure 1) and 57 counties that fall within one or more EDAs, including 33 coastal counties (Figure 2).

The data bases used to compile this report come from a variety of sources. These include other data bases, maps, nautical charts, surveys, literature reviews, and estimation techniques. In most cases, these sources are produced for reasons other than assessing the condition of the Nation's estuaries and near coastal waters. Consequently, the job of producing data bases that provide information for nationwide assessments of estuarine and near coastal waters requires evaluating existing data sources; aggregating data consistently for estuaries; distilling or aggregating data to manageable amounts of appropriate information; and formatting data in an easily understood manner. This process can take from several months to several years, depending on the level of effort applied and the condition and format of the original data. For example, the land use data presented here took two years to compile for EDAs despite its availability on digital tape. No data presented here were gathered directly from field sampling.

This project began in June 1987 and will be completed in early 1988. Because this is an interim draft, anyone using its data contents should consult the EPA/NOAA team developing the case study report to verify its accuracy.

Study Area

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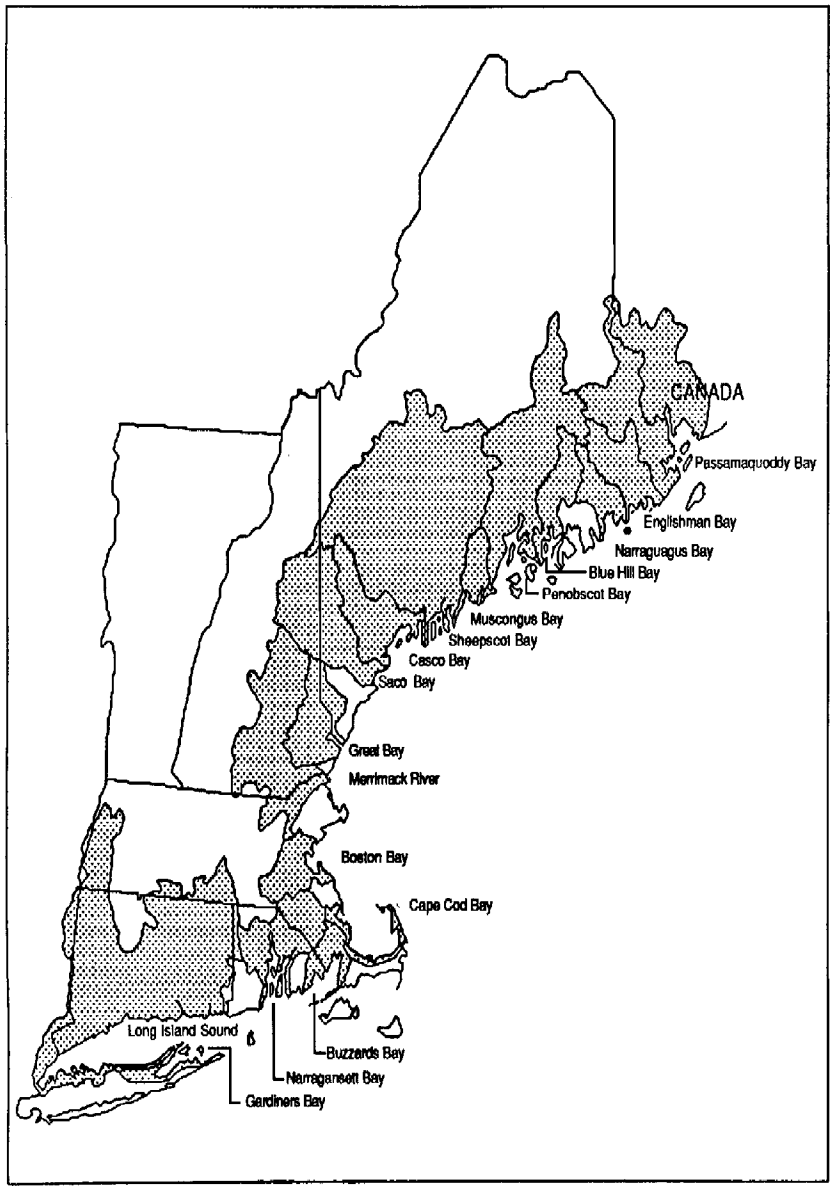

Figure 1. Estuarine Drainage Areas

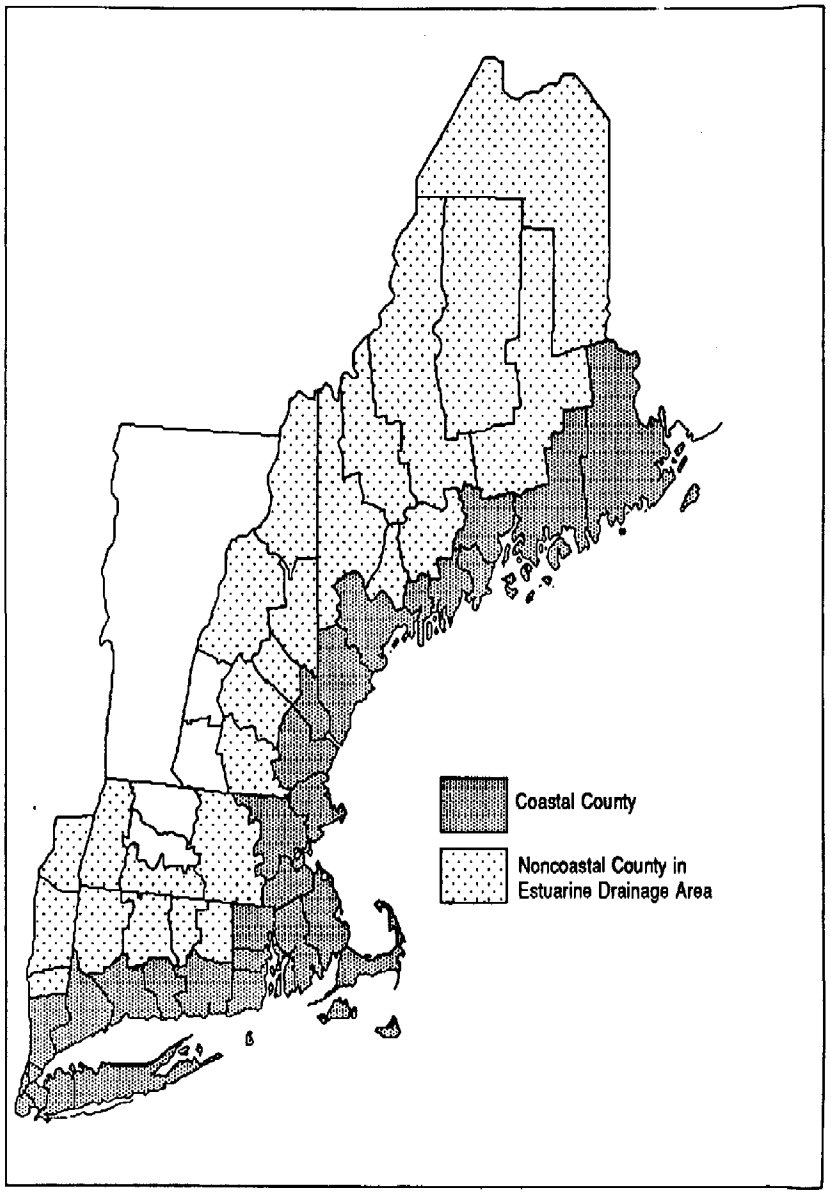

Figure 2. Coastal Counties and Noncoastal Counties within Estuarine Drainage Area

Physical and Hydrologic Characteristics

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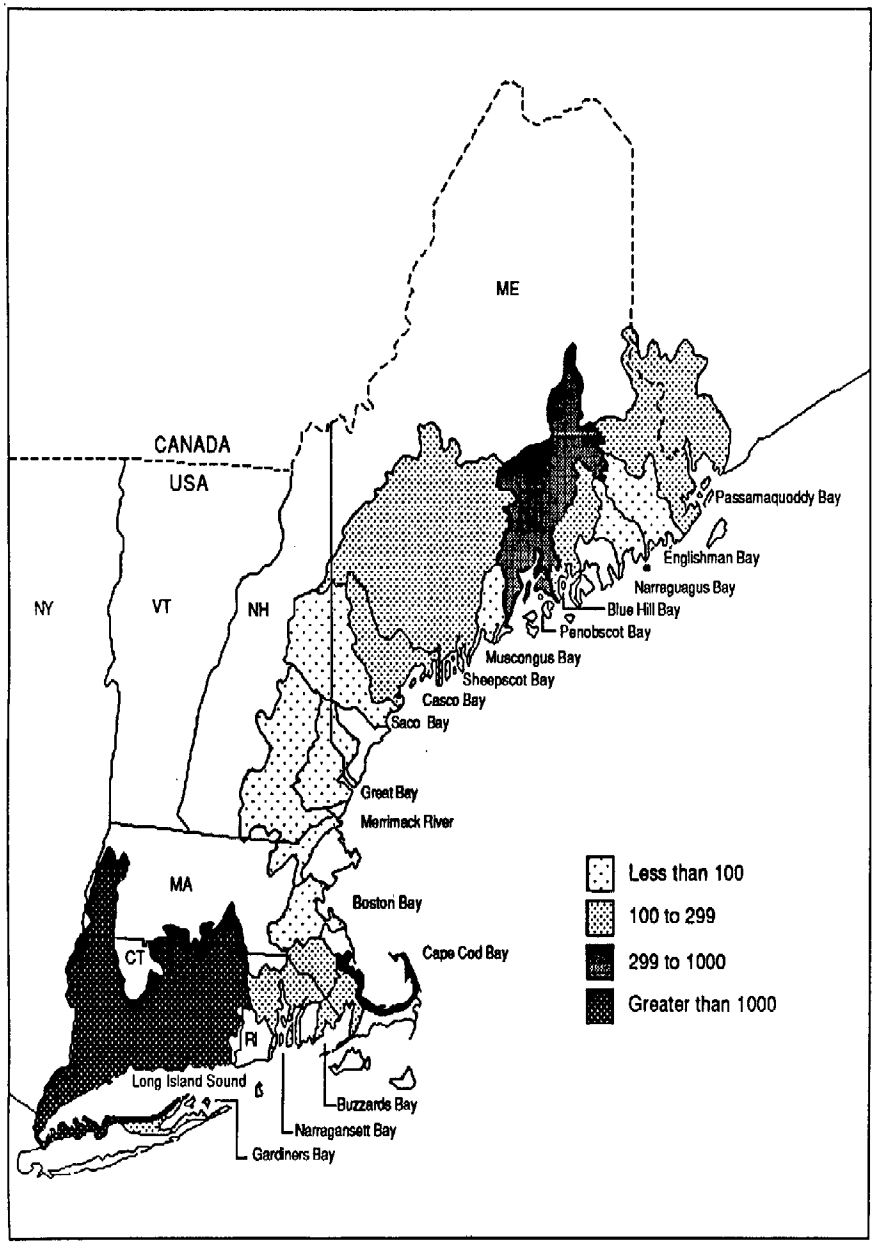

Figure 1.1 Area of estuarine surface water (square miles)

Introduction

The physical and hydrologic data presented in this section were selected from the *National Estuarine Inventory, Data Atlas, Volume* I, *Physical and Hydrologic Characteristics*. These data identify and specify the extent of 17 estuaries in the Northeast and present physical and hydrologic information for each. The physical and hydrologic aspects of estuaries are important in determining the biological productivity of a system, the distribution of chemicals, and the transport of materials such as pollutants. The data were derived from existing data bases.

The information presented here can be used to understand the general characteristics of each estuary and the similarities and differences among individual estuaries or groups of estuaries. Important physical parameters for which information was compiled include the dimensions of each estuary, its drainage area, and tidal information (Table 1.1). Table 2.1 presents the estuarine zones, listing the depth, area, and volume for each zone in each estuary, the stratification classification, and freshwater flow characteristics with flushing days for the freshwater fraction given. They are the primary determinants of estuarine processes that ultimately affect the ecology of a system. When combined with other physical parameters, these data will be used to assess the effects of pollutant discharges in each system.

The final report will include a more detailed description of the data, how they were obtained, and their reliability.

Table 1.1 Shoreline Characteristics

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Estuary	Estuarine Dimensions									Dredged Channel	Dredged Material Site	Drainage Area (sq. mi.)			Tidal Data		
						Perimeter (mi.)											
	Length (mi.)	Width (mi.)	Depth (ft.)	Total Area (sq. mi.)	Volume (cu. ft.) (10**9)	Shoreline	Ocean	Other	Total	Modified Length	Length (mi.)	Area (sq. mi.)	Fluvial	Estuarine(1)	Total	Prevailing Tide	Tidal Prism Volume (cu. ft.)(10**9)	Tidal Range (ft.) (2)
Passamaquoddy Bay	30	6	72	151	315	313	6	0	320	2.1	0.0	0.0	0	3,357	3,357	Semidiurnal	79	17
Englishman Bay	16	5	38	72	80	171	17	1	188	0.2	0.0	0.5	0	875	875	Semidiurnal	27	11
Narraguagus Bay	16	6	32	63	63	199	16	1	216	0.7	3.1	0.0	0	442	442	Semidiurnal	22	11
Blue Hill Bay	29	5	75	113	241	211	5	4	220	0.0	1.3	0.0	0	723	723	Semidiurnal	32	10
Penobscot Bay	63	8	72	356	725	494	21	4	519	7.7	2.0	2.0	6,250	3,130	9,380	Semidiurnal	99	13
Muscongus Bay	16	5	43	71	85	192	14	0	205	0.3	0.0	0.0	0	476	476	Semidiurnal	18	9
Sheepscot Bay	44	6	41	95	118	465	18	0	483	10.8	3.8	0.0	3,920	5,941	9,861	Semidiurnal	22	8
Casco Bay	29	8	42	152	191	351	23	0	374	7.6	8.6	1.8	0	1,143	1,143	Semidiurnal	41	9
Saco Bay	8	3	32	16	15	39	5	0	44	1.5	0.2	0.0	0	1,740	1,740	Semidiurnal	4	9
Great Bay	16	1	11	12	5	126	2	0	128	4.6	6.6	0.0	0	895	895	Semidiurnal	2	8
Merrimack River	25	1	12	5	2	45	0	0	45	1.2	0.0	0.0	2,680	2,183	4,863	Semidiurnal	1	8
Boston Bay	12	7	26	65	50	191	8	0	199	55.3	35.2	0.0	0	751	751	Semidiurnal	18	9
Cape Cod Bay	23	25	77	511	1178	242	7	0	249	6.2	6.9	2.1	0	761	761	Semidiurnal	138	9
Buzzards Bay	30	7	34	226	215	232	9	0	241	18.7	19.1	4.1	0	582	582	Semidiurnal	24	3
Narragansett Bay	29	9	30	157	139	301	14	0	314	34.5	41.9	0.5	451	1,316	1,767	Semidiurnal	17	3
Gardiners Bay	31	9	20	191	111	288	12	0	300	21.0	25.2	0.0	0	400	400	Semidiurnal	12	2
Long Island Sound	199	12	62	1,268	2,187	1,004	15	2	1,021	113.7	110.5	31.0	10,010	6,954	16,964	Semidiurnal	133	2
Total	-	-	-	3,524	5,721	4,864	191	12	5,067	286	264	42	23,311	31,669	54,980	-	688	-

Abbreviations: Square Miles, sq. mi.; Miles, mi.; Cubic Feet, cu. ft.; Feet, ft.

(1) Includes land and estuarine water surface area

(2) Tidal range is for mouth of estuary.

Table 1.2 Physical and Hydrologic Characteristics

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Estuary	Estuarine Zones									Stratification Classification		Freshwater Flow Characteristics				Average Annual Flow Ratio	Flushing-Days Fresh Water Fraction
	Tidal Fresh			Mixing Zone			Seawater										
	Depth (ft.)	Area (sq. mi.)	Volume (cu. ft.) (10**8)	Depth (ft.)	Area (sq. mi.)	Volume (cu. ft.) (10**8)	Depth (ft.)	Area (sq. mi.)	Volume (cu. ft.) (10**8)	Three-Month High Flow	Three-Month Low Flow	Daily Flow Rate* (cfs) (10**2)	7-day,10-year Low Flow (cfs)(10**2)	50-year Flood (cfs) (10**2)	100-year Flood (cfs) (10**2)		
Passamaquoddy Bay	32	5	44	40	16	178	77	136	2,931	MS	MS	62	5	309	350	0.004	95
Englishman Bay	7	2	4	12	9	30	42	65	763	HS	MS	16	1	387	438	0.003	83
Narraguagus Bay	8	1	2	11	5	15	35	64	616	HS	HS	9	1	182	206	0.002	111
Blue Hill Bay	8	1	2	42	4	47	77	110	2,361	HS	HS	13	1	318	362	0.002	283
Penobscot Bay	20	45	245	45	70	870	89	246	6,131	HS	MS	161	37	1,510	1,690	0.007	110
Muscongus Bay	9	1	2	8	7	15	47	64	837	HS	MS	6	1	169	200	0.002	219
Sheepscot Bay	7	8	17	10	17	45	52	78	1,122	HS	MS	176	35	2,225	2,492	0.036	12
Casco Bay	7	3	5	8	5	12	44	156	1,896	MS	VH	21	3	226	270	0.002	134
Saco Bay	13	1	4	10	2	6	37	14	143	HS	HS	36	4	400	455	0.039	8
Great Bay	8	1	2	6	8	13	19	6	32	MS	VH	20	2	120	136	0.039	8
Merrimack River	14	3	12	11	3	9	0	0	0	MS	VH	84	9	635	659	0.319	2
Boston Bay	0	0	0	38	1	11	26	68	485	VH	VH	18	1	63	73	0.005	42
Cape Cod Bay	0	0	0	11	5	16	78	543	11,762	VH	VH	18	--	--	--	0.006	923
Buzzards Bay	0	0	0	14	2	8	34	226	2,142	VH	VH	12	1	24	28	0.002	255
Narragansett Bay	17	3	14	17	20	94	32	142	1,283	VH	VH	32	2	342	386	0.008	83
Gardiners Bay	0	0	0	4	2	2	20	195	1,109	VH	VH	7	1	2	2	0.003	225
Long Island Sound	27	29	148	34	165	1,542	67	1,087	20,213	VH	VH	300	30	2,229	2,341	0.010	135
Total	-	103	834	-	341	2,912	-	3,200	53,826	-	-	-	-	-	-	-	-

Abbreviations: Moderately Stratified, MS; Highly Stratified, HS; Vertically Homogeneous, VH.

Figure 1.2 Comparison of Estuarine Surface Water, Estuarine Drainage, and Fluvial Drainage Areas

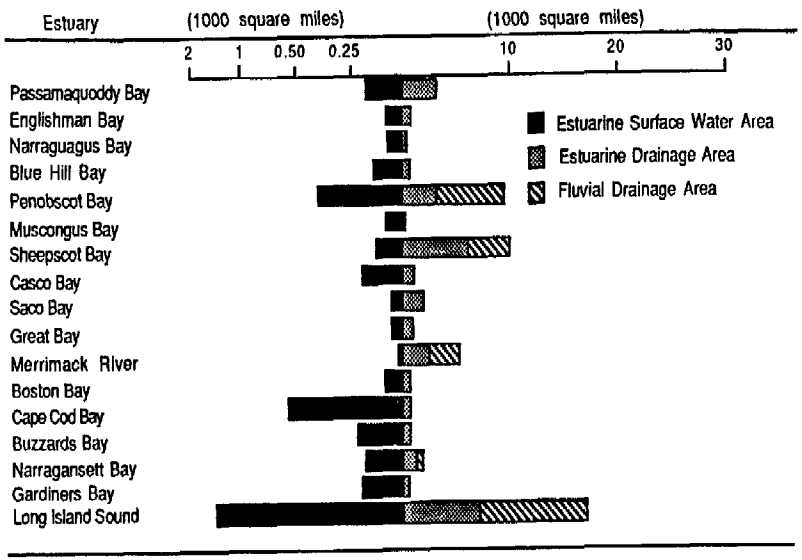
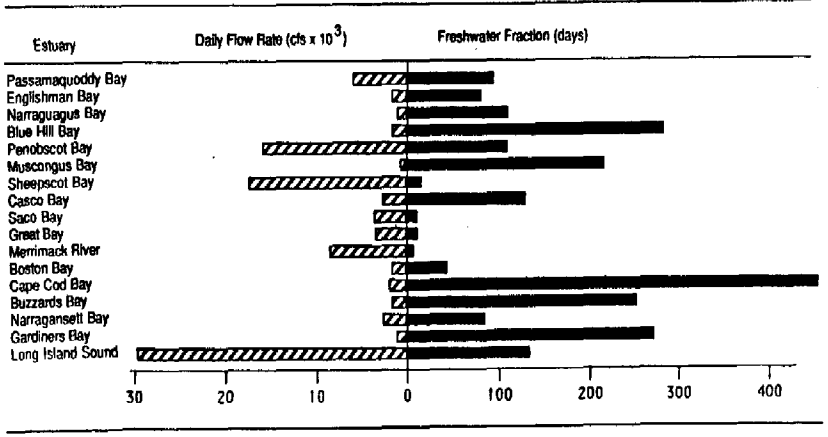


Figure 1.3 Freshwater inflow and flushing characteristics by estuary



Land Use and Population

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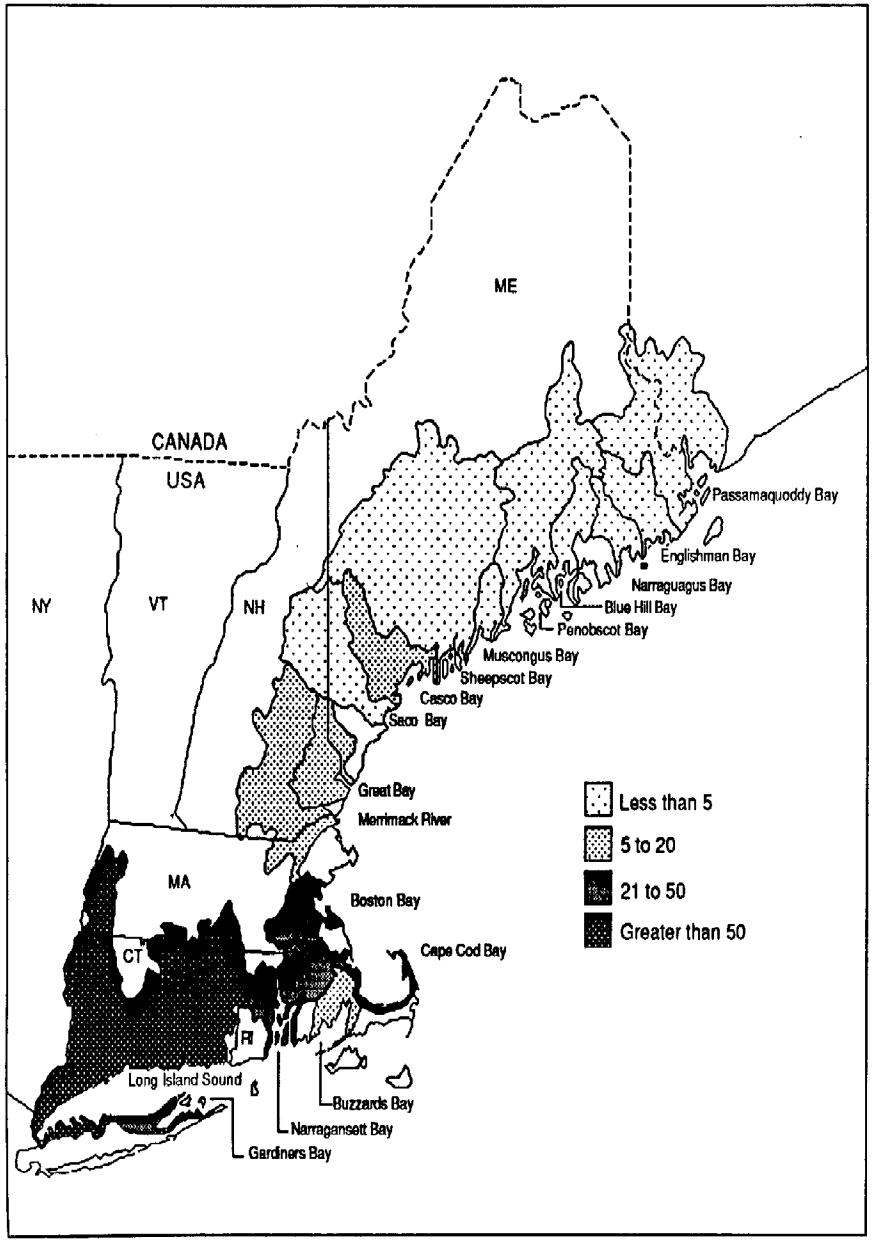

Figure 2.1 Percent of estuarine drainage area land that is urban

Introduction

This section presents estimates for five categories and ten subcategories of land use, population change during 1970 - 1985, and change in harvested cropland during 1978 - 1982. The source of all land use data is the *National Estuarine Inventory Data Atlas, Volume 2, Land Use Characteristics* The data are partial indicators of potential contaminant inputs that may enter estuarine waters and the extent to which the terrestrial ecosystems that are closely linked to sustaining their health have been altered. Most land use data are derived from digital tapes prepared from land use maps at scales of 1:100,000 or 1:250,000 for the U.S. Geological Survey's Land Use and Land Cover (LU/LC) Program. The LU/LC Program develops land use data from interpretation of high altitude aerial photography usually obtained from NASA's U-2 and National High Altitude Programs. Spatial resolution of the land use data is 10 or 40 acres, depending on the category or subcategory. Photography for these estuaries was taken between 1971 and 1978.

Land Use Estimates are presented for 17 estuarine drainage areas (EDAs) (Table 2.1) and 58 counties that fall within any part of an EDA (Appendix 2). The data categories and subcategories have been aggregated differently from the land use estimates in the LU/LC Program and from Volume 2. Several urban subcategories are included in "Other Urban," while the category "Total Other" is an aggregation of all barren lands and wetlands.

Data on change in population and harvested cropland (Table 2.2 and Appendix 2) are based on county data from the Census of Population, the Census of Agriculture, land area of the EDA, and the percent of residential land and harvested cropland for each county in the 17 EDAs of the study area. This information provides some indication of the extent to which land use may have changed since the land use data were compiled during the 1970s.

More detailed information will be presented on the land use categories and subcategories, data organization and presentation, and reliability of the data in the final report.

Figure 2.2 Land Use by Estuarine Drainage Area

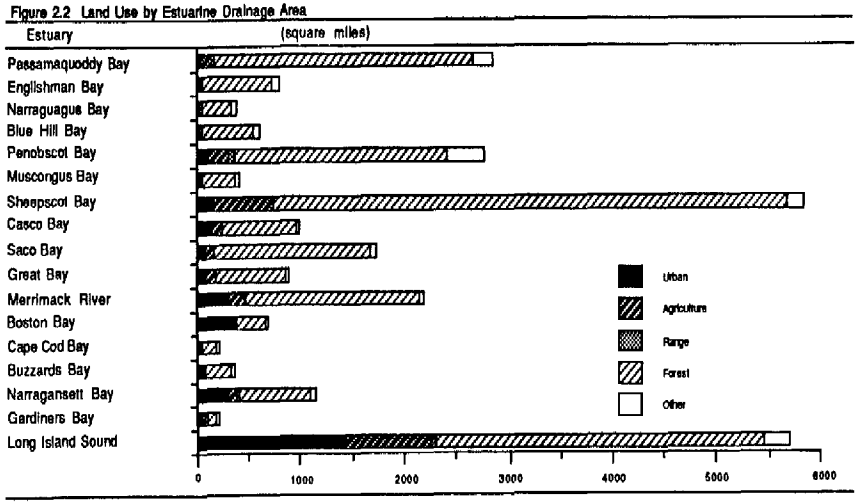

Figure 2.3 Population Change by Estuary 1970-1985

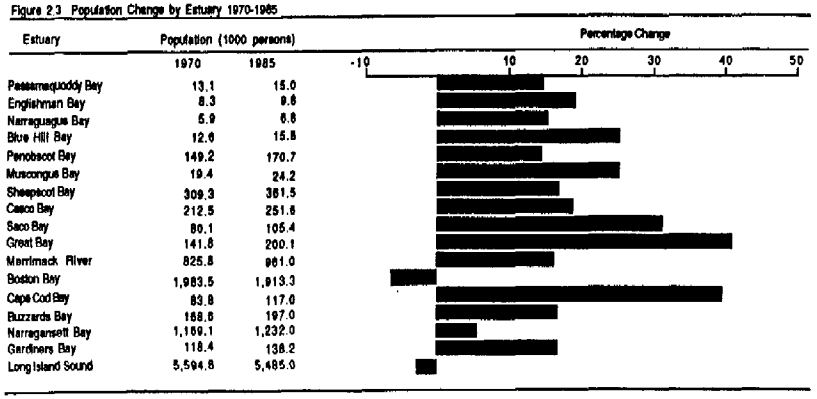

Table 2.1 Land Use by Estuarine Drainage Area (sq. mi.) - circa 1975

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Estuary	Residential	Commercial/ Services	Industrial	Transportation	Other Urban	**Total Urban**	Cropland/ Pasture	Other Agriculture	**Total Agriculture**	**Total Range**	Deciduous Forest	Evergreen Forest	Mixed Forest	**Total Forest**	**Total Other (1)**	**Total Land**
Passamaquoddy Bay(2)	7	<1	<1	<1	<1	**25**	59	<1	**109**	**33**	212	742	171	**2,496**	**177**	**2,839**
Englishman Bay	8	<1	0	4	<1	**14**	34	0	**34**	**14**	66	449	146	**661**	**78**	**799**
Narraguagus Bay	3	<1	0	0	0	**4**	24	0	**24**	**14**	52	120	114	**286**	**61**	**389**
Blue Hill Bay	21	1	<1	<1	2	**25**	8	<1	**9**	**28**	77	147	275	**499**	**49**	**608**
Penobscot Bay	82	10	3	15	11	**121**	169	2	**171**	**52**	310	733	1,027	**2,070**	**355**	**2,769**
Muscongus Bay	14	<1	<1	0	<1	**16**	35	<1	**36**	**6**	34	33	235	**302**	**46**	**404**
Sheepscot Bay	102	18	6	18	21	**165**	569	5	**574**	**11**	755	1,265	2,899	**4,919**	**170**	**5,838**
Casco Bay	96	17	3	13	11	**141**	100	2	**102**	**1**	49	335	326	**710**	**26**	**979**
Saco Bay	54	7	1	4	10	**76**	73	2	**75**	**1**	316	517	679	**1,512**	**61**	**1,723**
Great Bay	63	13	2	5	8	**91**	91	2	**93**	**1**	11	201	457	**669**	**28**	**880**
Merrimack River	198	41	5	19	28	**291**	158	5	**163**	**1**	283	274	1,115	**1,672**	**52**	**2,177**
Boston Bay	250	56	7	16	32	**362**	15	<1	**16**	**0**	281	<1	5	**287**	**18**	**682**
Cape Cod Bay	38	3	<1	2	7	**51**	2	0	**2**	**5**	55	25	45	**125**	**32**	**213**
Buzzards Bay	38	5	1	5	10	**59**	30	0	**30**	**4**	51	17	166	**234**	**25**	**354**
Narragansett Bay	184	40	9	17	44	**294**	98	2	**100**	**10**	416	50	234	**700**	**49**	**1,151**
Gardiners Bay	38	5	<1	5	6	**54**	33	<1	**34**	**9**	98	<1	0	**99**	**11**	**203**
Long Island Sound	988	171	54	62	143	**1,418**	801	21	**822**	**52**	2,727	225	190	**3,142**	**250**	**5,693**
REGIONAL TOTALS	2184	387	91	185	333	**3,180**	2,299	41	**2,340**	**242**	5,793	5,133	8,084	**19,010**	**1,488**	**26,260**

(1) Includes "Wetland" and "Barren Land" categories; a detailed breakdown of wetlands by estuary is found in Section VI.
(2) Category values for USA and Canadian portions of estuarine drainage area; subcategory values for USA portion only.

Table 2.2 Trends in Population and Harvested Cropland by Estuarine Drainage Area

Estuary	Land in Estuarine Drainage Area (sq. mi.)	Population (thousands)					Harvested Cropland (sq. mi.) (1)		
		1970	1980	1985	Percent Change 1970 - 1985	Density (per sq. mi.) 1985	1978	1982	Percent Change
Passamaquoddy Bay	1,352	13	15	15	14.9	11	11	11	0.7
Englishman Bay	799	8	10	10	18.9	12	7	7	1.7
Narraguagus Bay	372	6	7	7	15.4	18	5	5	1.0
Blue Hill Bay	608	13	15	16	25.6	26	4	4	11.4
Penobscot Bay	2,769	149	167	171	14.4	62	67	67	0.4
Muscongus Bay	404	19	23	24	25.1	60	12	13	7.3
Sheepscot Bay	5,838	309	351	362	16.9	62	239	245	2.5
Casco Bay	979	212	240	216	18.4	257	36	37	3.8
Saco Bay	1,723	80	98	105	31.5	61	30	30	0.8
Great Bay	880	142	182	200	41.1	227	34	31	-9.4
Merrimack River	2,177	826	912	961	16.4	441	67	62	-8.4
Boston Bay	682	1,983	1,895	1,913	-3.5	2,806	7	7	-6.9
Cape Cod Bay	213	84	110	117	39.5	552	1	2	5.9
Buzzards Bay	354	169	191	197	16.8	557	18	19	3.4
Narragansett Bay	1,151	1,169	1,209	1,232	5.4	1,070	49	48	-1.9
Gardiners Bay	203	118	135	138	16.7	681	21	20	-6.1
Long Island Sound	5,693	5,595	5,397	5,485	-2.0	963	306	309	0.9
REGIONAL TOTALS	26,197	10,896	10,958	11,168	2.5	426	913	914	0.001

Abbreviation: square miles, sq. mi.

(1) Values of harvested cropland shown are rounded; percentage changes in harvested cropland are based on unrounded values.

Nutrient Discharges to Estuaries

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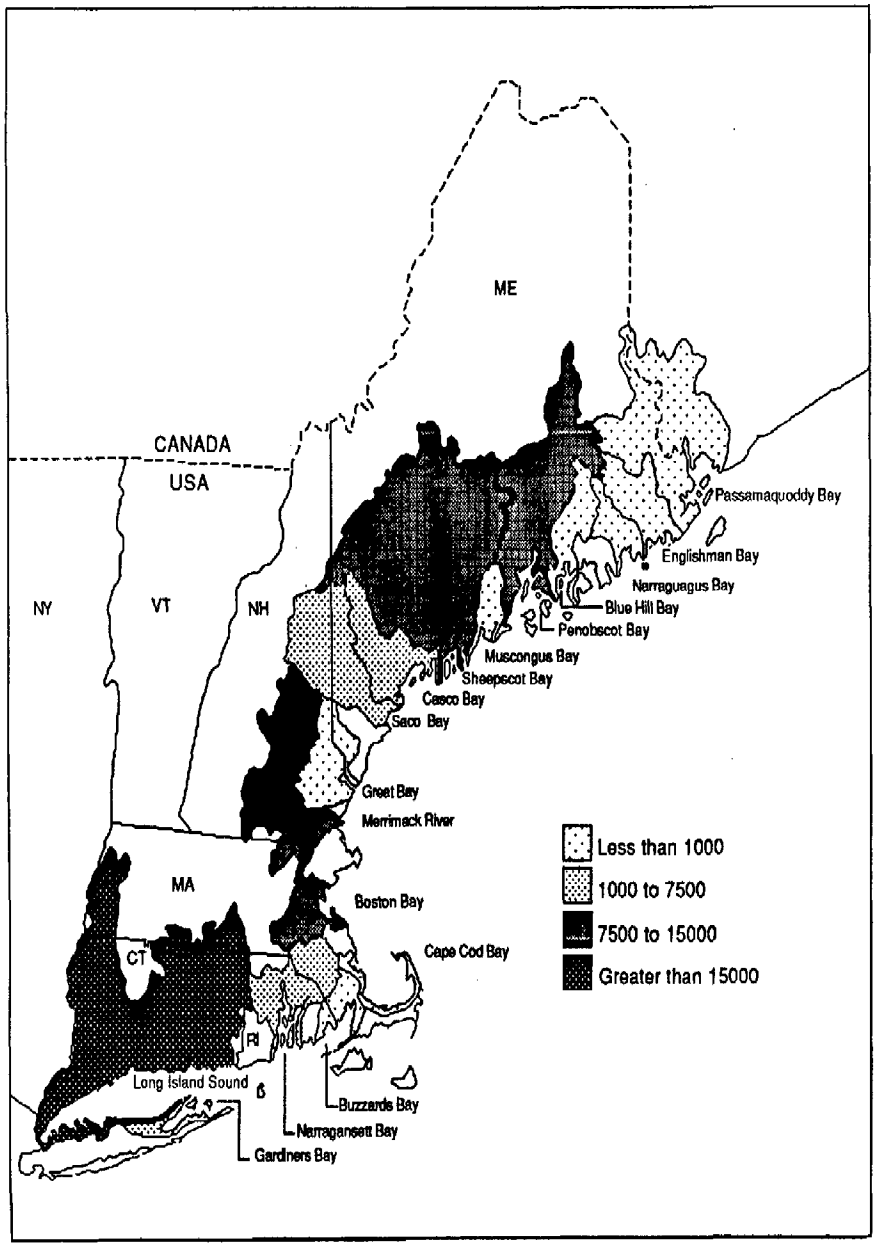

Figure 3.1 Total nitrogen and phosphorus discharges to estuaries (tons/year, circa 1982)

Introduction

Nutrient overenrichment has been identified as a major problem in some of our Nation's estuaries and open coastal waters. To understand the effects of eutrophication, estimates of nitrogen and phosphorus discharges to 17 estuaries in the region are presented by source category (Table 3.1), as are estimates of and factors that influence nutrient discharges to coastal areas (Table 3.2). The data are taken from NOAA's *National Coastal Pollution Discharge Inventory*.

Annual and seasonal discharge estimates for total nitrogen and phosphorus by point, non-point, and upstream sources categories are presented. Point source categories include wastewater treatment plants and industrial facilities; non-point sources include forest, agriculture, urban, and other nonurban areas, and upstream sources are major rivers with an annual average flow in excess of 1,000 cubic feet per second that originate outside of and flow into the region. The data are organized by Estuarine Drainage Area (EDA) and are complete for the coastal counties contained within the EDAs. Data on nutrient discharges by source categories are not available for those portions of the EDA outside of the coastal county boundary.

Discharge estimates were made based on factors such as land use, amounts of applied fertilizer , and local precipitation. They do not necessarily represent discharges directly to an estuary, but rather "end-of-pipe" discharges and non-point runoff into rivers, streams, and creeks within the EDA that eventually may enter the estuary. Subsequent transport, deposition, and chemical cycling of nitrogen and phosphorus in the water column will affect ambient levels of nutrients in estuaries.

The final report will include a detailed description of the data, how they were obtained, their reliability, and nutrient discharges estimates by season. An attempt will also be made to make comparisons between estuaries.

Table 3.1 Nutrient Discharges to Northeast Estuaries (tons/year) - circa 1982

Draft 11/87

Estuary	Non- Point										Point						Upstream		Totals			
	Agriculture		Forest		Urban		Other		Total		POTWs		Industry		Total							
	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N+P	N/P
Passamaquoddy Bay	86	5	19	0	86	14	1	0	192	19	18	13	84	0	102	13	0	0	294	32	326	9
Englishman Bay	65	3	15	0	42	7	2	0	124	10	17	12	10	1	27	13	0	0	151	23	174	7
Narraguagus Bay	62	3	8	0	20	3	3	0	93	6	8	6	5	0	13	6	0	0	106	12	118	9
Blue Hill Bay	16	1	10	0	77	13	4	0	107	14	30	21	18	2	48	23	0	0	155	37	192	4
Penobscot Bay	59	4	147	1	143	23	3	0	352	28	77	57	99	4	176	61	7,280	686	7,808	775	8,583	10
Muscongus Bay	27	2	0	0	17	3	0	0	44	5	13	10	1	0	14	10	0	0	58	15	73	4
Sheepscot Bay	253	14	32	0	188	32	1	0	474	46	67	52	10	0	77	52	8,190	543	8,741	641	9,382	14
Casco Bay	367	13	30	0	270	45	0	0	667	58	408	273	343	140	751	413	0	0	1,418	471	1,889	3
Saco Bay.	58	2	2	0	133	22	0	0	193	24	149	101	37	15	186	116	875	55	1,254	195	1,449	6
Great Bay	166	7	4	0	227	36	0	0	397	43	230	153	13	7	243	160	0	0	640	203	843	3
Merrimack River	83	4	0	0	531	86	0	0	614	90	1,310	814	37	2	1,347	816	8,150	722	10,111	1,628	11,739	6
Boston Bay	17	1	0	0	1,794	302	0	0	1,811	303	7,461	4,651	33	7	7,494	4,658	0	0	9,305	4,961	14,266	2
Cape Cod Bay	3	0	0	0	108	17	2	0	113	17	267	168	0	0	267	168	0	0	380	185	565	2
Buzzards Bay	38	3	0	0	124	20	1	0	163	23	306	193	0	0	306	193	0	0	469	216	685	2
Narragansett Bay	345	17	1	0	1,363	217	4	0	1,713	234	2,470	1,540	391	4	2,861	1,544	0	0	4,574	1,778	6,352	3
Gardiners Bay	158	4	0	0	183	29	0	0	341	33	628	391	16	16	644	407	0	0	985	440	1,425	2
Long Island Sound	1,827	38	61	1	3,639	589	1	0	5,528	628	18,922	4,980	1,071	20	19,993	5,000	24,627	1,899	50,148	7,527	57,675	7
Total	3,630	121	329	2	8,945	1,458	22	0	12,926	1,581	32,381	13,435	2,168	218	34,549	13,653	49,122	3,905	96,597	19,139	115,736	5

Abbreviations: Nitrogen, N; Phosphorus, P; Publicly Owned Wastewater Treatment Works, POTWs.

Table 3.2 Factors Influencing Nutrient Discharges to Northeast Estuaries - circa 1982

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Estuary	Land Area (square miles)			Precipitation (inches)					Publicly Owned Treatment Works		Fertilizer Application in Coastal Counties (tons/year) (2)			
	EDA	Coastal County (1)		Winter	Spring	Summer	Fall	Long Term Avg. Annual	Major/ Minor	Total	Coastal Counties in EDA		Total in EDA	
											N	P	N	P
Passamaquoddy Bay (3)	1,328	1,220	(92)	11.2	8.2	14.0	8.8	44.2	0/21	21	179	79	185	83
Englishman Bay	799	799	(100)	10.5	8.6	12.3	8.7	44.2	0/1	1	122	55	122	55
Narraguagus Bay	372	372	(100)	10.5	8.6	12.3	8.7	44.2	0/0	0	113	51	113	51
Blue Hill Bay	608	587	(97)	9.6	9.1	10.4	8.9	----	0/2	2	74	33	74	33
Penobscot Bay	2,769	962	(35)	8.4	8.6	11.1	8.7	40.3	1/9	10	389	172	2,705	1,214
Muscongus Bay	404	404	(100)	10.2	9.3	13.1	6.8	----	0/4	4	226	100	226	100
Sheepscot Bay	5,838	925	(16)	8.5	8.8	17.8	7.1	----	1/6	7	672	298	3,859	1,704
Casco Bay	979	827	(84)	8.9	10.7	12.7	7.4	40.8	2/12	14	529	233	586	259
Saco Bay	1,723	536	(31)	8.8	8.7	13.7	7.5	41.6	2/4	6	516	227	655	290
Great Bay	880	838	(95)	8.4	8.3	13.6	8.0	40.9	6/15	21	480	156	160	653
Merrimack River	2,177	665	(30)	8.7	9.2	14.9	10.2	43.3	5/2	7	494	130	1,108	144
Boston Bay	682	668	(97)	9.9	9.2	19.5	9.9	44.0	2/8	10	156	38	162	41
Cape Cod Bay	213	213	(100)	10.5	9.1	15.6	11.2	41.7	2/0	2	7	2	7	2
Buzzards Bay	354	354	(100)	11.0	8.9	14.4	12.1	42.3	1/4	5	459	113	459	113
Narragansett Bay	1,151	1,151	(100)	10.8	8.8	16.8	11.1	43.3	10/13	23	1,531	367	1,532	366
Gardiners Bay	203	203	(100)	12.4	11.3	16.9	6.7	43.9	1/3	4	256	93	255	94
Long Island Sound	5,693	2,773	(49)	10.0	10.5	16.7	7.7	----	48/18	66	5,945	1,661	5,945	1,661
Total (4)	26,173	13,497	--	9.4	8.6	13.6	8.2	42.7	81/122	203	12,148	3,808	18,153	6,863

Abbreviations: Estuarine Drainage Area, EDA; Nitrogen, N; Phosphorus, P.

(1) Numbers in parentheses are percent of total.
(2) Fertilizer Application is pro-rated for Estuarine Drainage Area not included in coastal counties.
(3) EDA land area does not include Canadian portion of EDA.
(4) Precipitation values are average values.

Figure 3.2 Nutrient Discharges by Source Catagory for Northeast Region

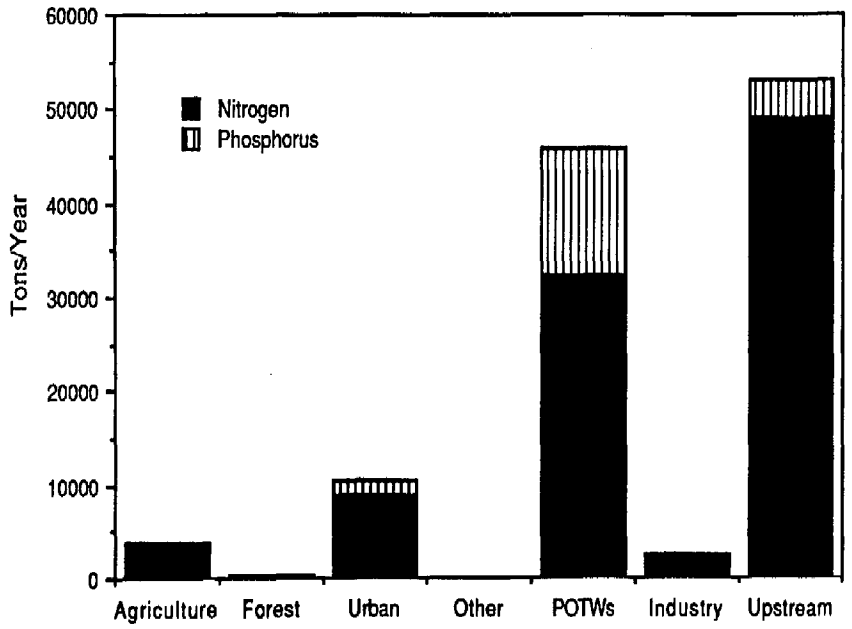


Figure 3.3 Nitrogen discharges by source and estuary

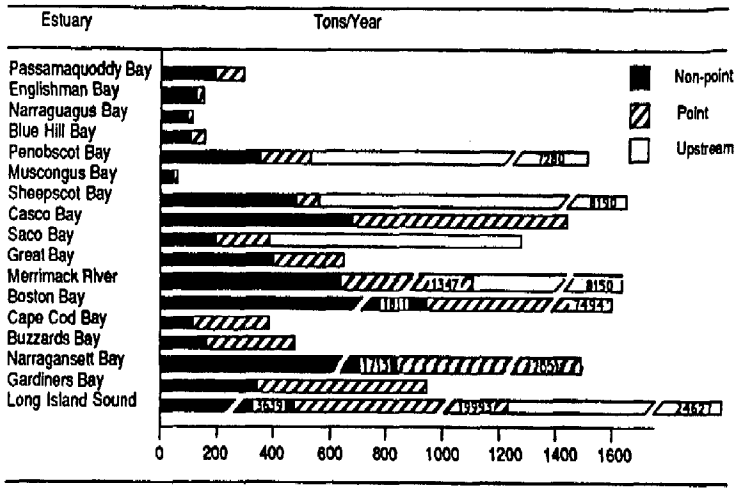
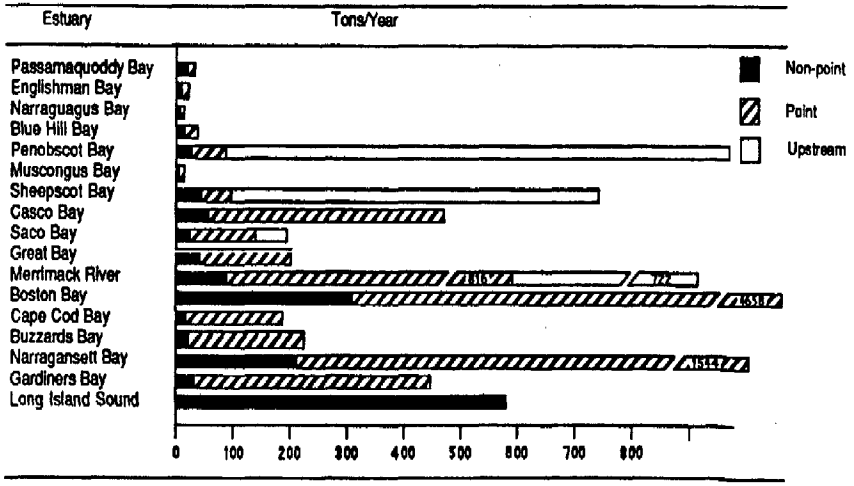


Figure 3.4 Phosphorus discharges by source and estuary



Classified Shellfish Waters

Contents

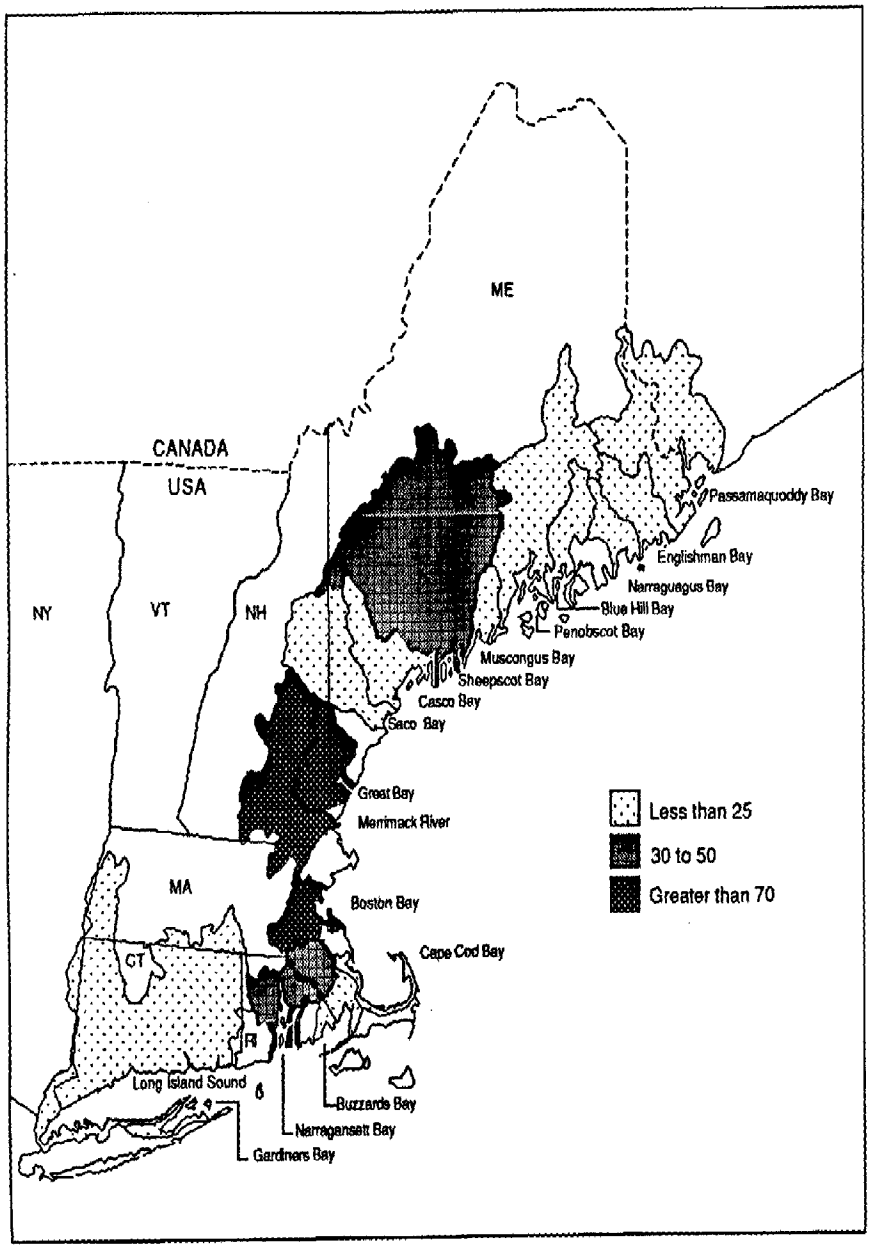


Figure 4.1 Percent of shellfish waters by estuary that are harvested limited

Introduction

This section presents data on estuarine waters classified for the commercial harvest of oysters, clams, or mussels and on the sources of pollution affecting these waters. Data were collected from interviews with state shellfish control agency personnel and from written reports, and are compiled by estuary. Data collection has not been completed for three estuaries in the region, Narragansett Bay, Gardiners Bay, and Long Island Sound, but will be available for the final report.

The primary purpose of classification is to protect the public from consumption of shellfish contaminated by sewage that may contain pathogenic bacteria or viruses. Waters are classified by states according to guidelines established by the National Shellfish Sanitation Program, a cooperative program of the U.S. Food and Drug Administration, shellfish producing states, and the shellfish industry. Most waters are classified on the basis of sanitary surveys that: 1) identify actual and potential pollution sources; 2) evaluate meteorological and hydrologic conditions; and 3) sample waters for bacteriological quality. Four classifications are defined as:

1. Approved - Waters from which shellfish may be harvested for direct marketing.

2. Conditionally Approved - Waters meet the approved criteria at some time periods during the year and may be harvested at these times only.

3. Restricted - Waters do not meet the approved criteria, but may be harvested if shellfish are subjected to a suitable and effective purification process.

4. Prohibited - Waters may not be harvested.

Sources of pollution were identified for each area that is classified as conditionally approved, restricted, or prohibited. Percent of area affected by a source is the ratio of total acreage of all areas affected by the source to the total acreage of conditionally approved, restricted, and prohibited water in the estuary.

Table 4.1 Classified Shellfish Waters by Estuary - 1985

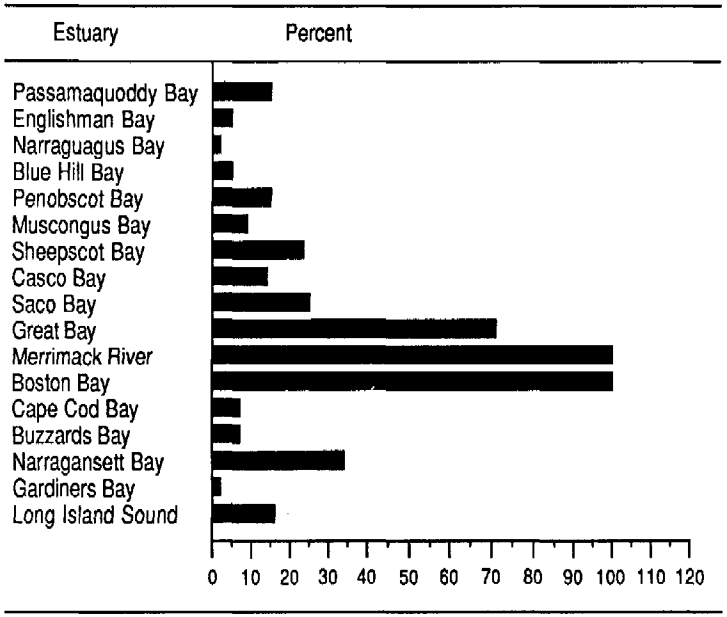
Draft 11/87

Estuary	Classification (acres)					Unclassified Area (acres)	Percent Harvest Limited	Sources of Harvest Limited Classification (Percent of Harvest Limited Waters) (1)									
								Non-Point						Point			
	Approved	Prohibited	Conditional	Restricted	Total Harvest Limited			Boating, Shipping,	Waste, Spills	Urban Runoff	Agriculture, Feedlots	Wildlife, Forestry	Septics	STP's	Straight Pipes	CSO's, Sewer Tie-Ins	Industry
Passamaquoddy Bay	33,590	6,126	13	0	6,139	0	15	0	0	0	1	0	31	69	0	0	0
Englishman Bay	56,485	1,997	222	804	3,023	0	5	0	0	0	0	0	35	65	0	0	0
Narraguagus Bay	55,555	1,290	41	0	1,331	0	2	0	0	0	0	0	100	0	0	0	0
Blue Hill Bay	71,144	2,896	0	704	3,600	0	5	0	0	0	0	0	94	79	0	0	0
Penobscot Bay	197,972	27,349	3,163	3,259	33,771	0	15	0	5	0	0	0	83	53	0	0	7
Muscongus Bay	41,940	1,525	2,099	575	4,199	0	9	0	0	0	0	0	31	69	0	0	0
Sheepscot Bay	35,962	23,116	2,310	1,933	27,359	0	43	0	0	0	0	0	27	84	0	0	57
Casco Bay	91,892	12,286	2,273	998	15,557	0	14	61	62	0	0	0	25	14	0	0	0
Saco Bay	9,849	1,581	0	1,379	2,960	0	23	0	0	0	0	0	0	72	0	0	28
Great Bay	3,599	8,671	0	329	9,000	0	71	0	0	11	37	37	15	93	8	0	0
Merrimack River	0	2,243	0	216	2,459	0	100	9	0	100	0	9	9	91	0	0	100
Boston Bay	0	11,533	0	3,745	15,278	36,689	100	63	3	87	0	0	0	86	0	3	43
Cape Cod Bay	45,919	3,131	213	0	3,344	310,369	7	65	0	2	20	77	28	9	21	3	2
Buzzards Bay	117,800	9,197	309	0	9,506	0	7	6	0	0	6	6	7	88	0	7	86
Narragansett Bay	70,226	24,343	11,447	0	35,790	0	34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gardiners Bay	124,094	2,283	31	0	2,314	0	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Long Island Sound	718,183	129,961	5,738	0	135,699	0	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL	1,674,210	274,413	27,859	13,981	316,253	347,058	16	-	-	-	-	-	-	-	-	-	-

Abbreviations: not available, NA.

(1) Sources of Harvest Limited Classification may exceed 100 percent because more than one source may contribute to contamination of shellfish waters.

Figure 4.2 Harvest limited shellfish growing waters by estuary



Toxic Discharges and Hazardous Waste Disposal Sites

Contents

EPA/NOAA Team on Near Coastal Waters

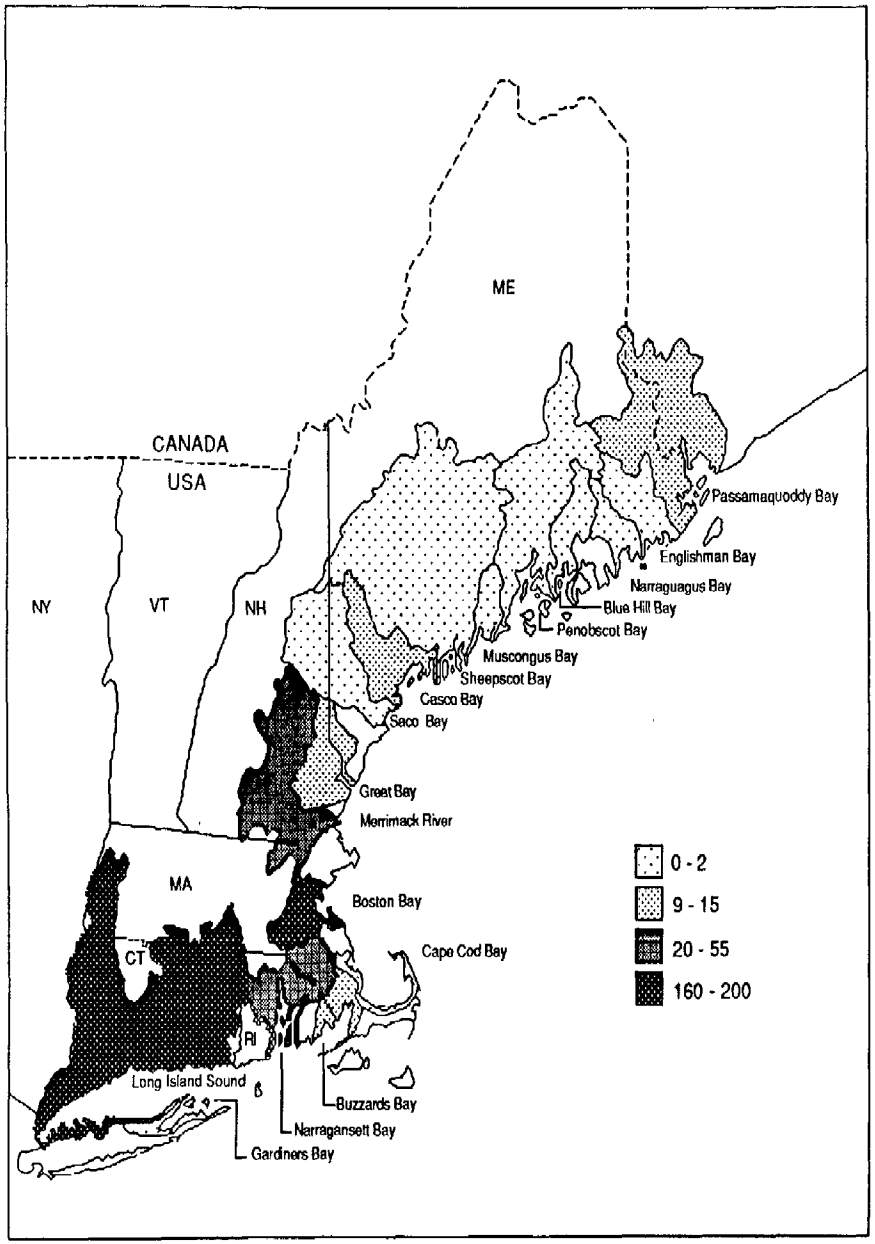


Figure 5.1 Total trace metal discharges by estuarine drainage area (tons/year, circa 1982)

Introduction

Although numerous compounds have been identified as toxic pollutants, 129 have been identified on the Environmental Protection Agency's (EPA) priority pollutant list. More is generally known about the chemical and toxicological characteristics than the sources, location, and quantities discharged into the environment. The available information is mostly incomplete and highly variable. For many compounds, almost no data exist; for others, reliable information exists for only a few facilities, as for example in a National Pollutant Discharge Elimination System (NPDES) permit. Despite this lack of information, many decisions must be made about how toxic-related programs will be conducted. Consequently, every opportunity must be made to make maximum use of all existing information that may be useful.

This section provides estimates of the discharge of selected toxic compounds in the coastal counties of each estuary. The estimates are organized by major source category and are representative of discharge conditions during the early 1980's. Also included is information on the number and characteristics of hazardous waste sites in the estuarine drainage areas (EDAs) of the region. This information can help provide a basis for understanding further the scale and geographic scope of potential toxic-related problems throughout the region. Although estimates are provided for relatively few toxic compounds (only eight), the facilities inventoried may also be important dischargers of many other toxic compounds.

The information presented is obtained from readily available sources, allowing for a timely synthesis in a matter of weeks instead months or years. Discharge estimates are taken from NOAA's *National Coastal Pollutant Discharge Inventory (NCPDI), and* information on hazardous waste sites from EPA's *Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS).*

Background

Chemical products have helped improve our standard of living, but frequently that improvement has been achieved at a high cost to the environment.

The EPA helps regulate and control the discharge of toxic pollutants to the environment. The statutes shown in Table 5.0 show the tools EPA must use to identify and control the potential risks posed by today's thousands of commercial chemicals.

The Clean Water Act (CWA) has provided the rationale and regulatory authority for the majority of EPA's efforts to control toxic pollutants in surface water. The 1987 CWA amendments call for major new initiatives on the part of both EPA and states. Management attention is now being focused on waters that are expected to remain polluted even after dischargers have installed the treatment technologies required by law.

The EPA's regulatory program for controlling toxics has concentrated on 129 priority pollutants as a subset of the 65 classes of chemical compounds listed in the CWA. (These 65 classes actually include thousands of individual chemicals.) Over the

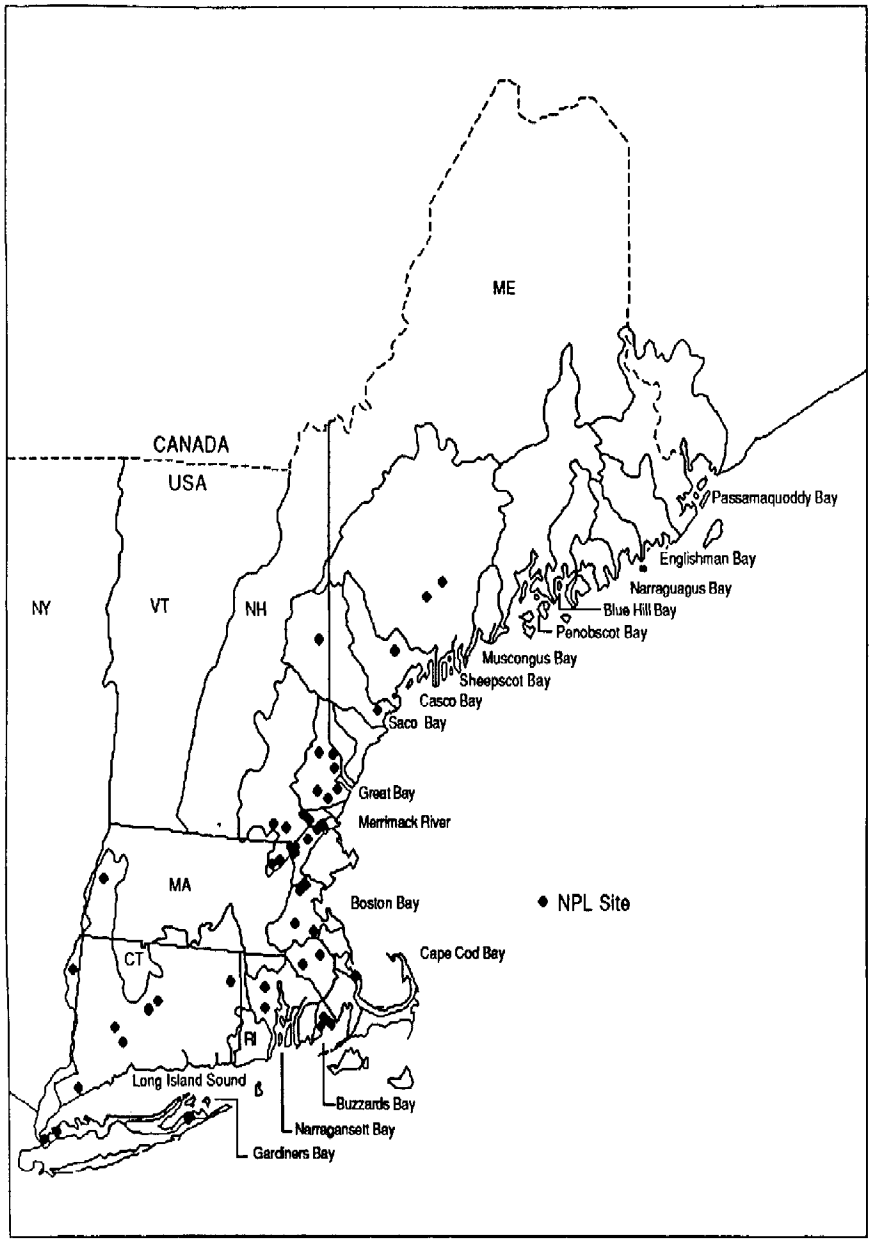


Figure 5.2 NPL sites by estuarine drainage area

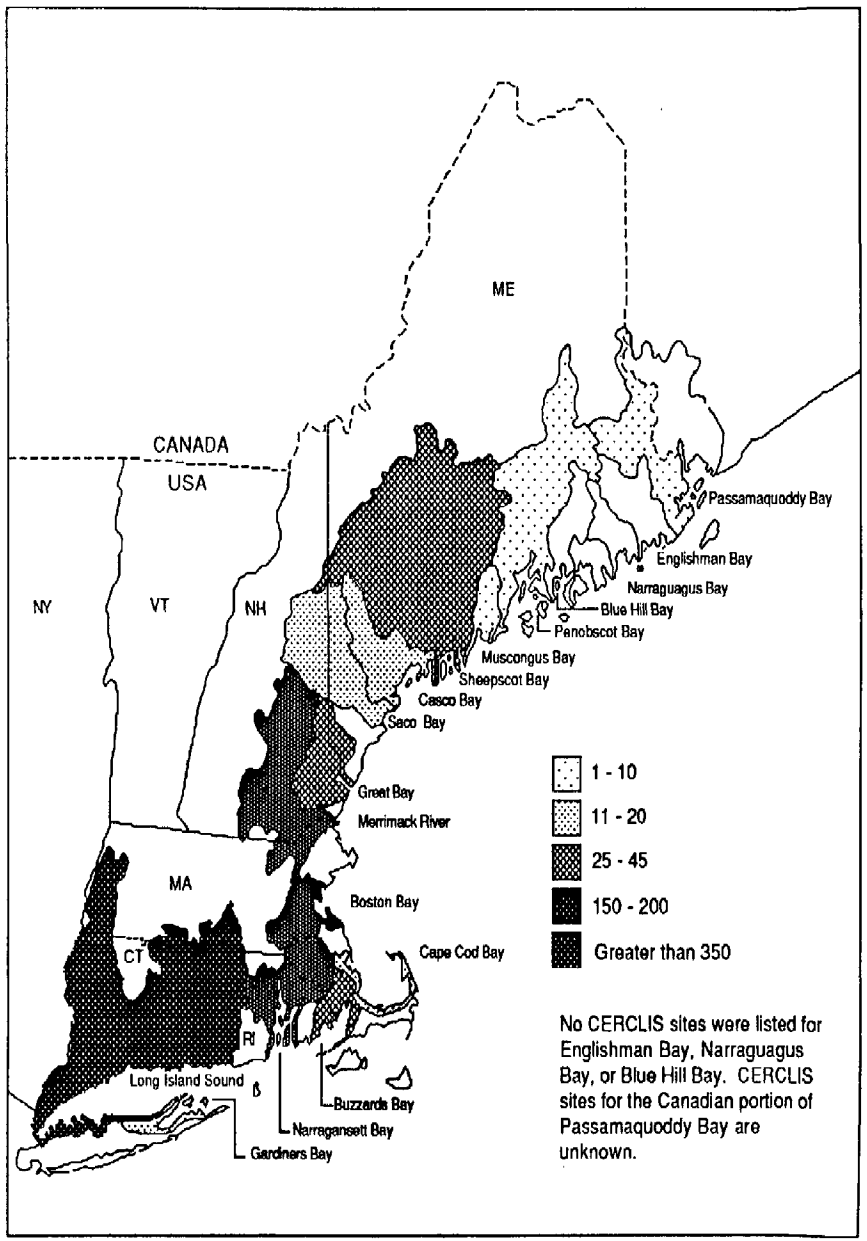


Figure 5.3 Number of CERCLIS sites by estuarine drainage area

Table 5.0 Major Toxic Chemical Laws Administered by EPA

Statute	Major Provision
Clean Water Act (CWA) 1987	Authorizes EPA to develop criteria and issue permits that control the discharge of pollutants to surface waters.
Marine Protection, Research and Sanctuaries Act (MPRSA)	Regulates ocean dumping of toxic toxicants
Safe Drinking Water Act (SDWA) 1986	Requires EPA to set drinking water standards to protect public health from hazardous substances
Toxic Substances Control Act (TSCA)	Authorizes EPA to regulate the production, use, or disposal of chemicals
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	Authorizes EPA to register pesticides and specify the terms of their use, permit unregistered uses in certain circumstances, and remove unreasonably hazardous pesticides from the marketplace
Resource Conservation and Recovery Act (RCRA)	Authorizes EPA to set standards for the generation ,transportation, storage or disposal of chemicals
Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA)1986	Authorizes the cleanup of sites contaminated with hazardous substances
Clean Air Act (CAA)	Authorizes EPA to set emission standards to limit the release of hazardous air pollutants

years, the program has used a variety of control measures, including combinations of technology-based discharge permits, compliance inspections, enforcement actions, and grant programs to upgrade existing sewage facilities and to build new ones. Nevertheless, toxic contamination still remains a significant threat in many areas of the Nation.

To counteract the threat of toxic contamination, EPA has used all the legislative, planning, and management tools it has available. These include: end-of-pipe toxicity testing to determine limits for water quality based NPDES permits; strengthening the program that requires industrial dischargers at sewage treatment plants to pretreat their wastes; and, using the provisions of the Toxic Substances Control Act, the Federal Insecticide, Fungicide, and Rodenticide Act, and the Endangered Species Act to restrict or ban the use of toxic chemicals in sensitive habitats. In addition, EPA has focused planning and management activities on geographical problem areas of ecological importance, such as bays or estuaries, that are vulnerable to systemic contamination.

The scope and complexity of water quality management issues are expanding rapidly, particularly with respect to toxic pollutants. Managers need more and better information than ever before. An important first step is to make maximum use of existing information to identify potential impact situations so that data collection and management actions can be better targeted to priority problem areas.

The data presented in this section are an initial step in developing information that can be used by managers to identify geographic relationships among toxic pollution problems, factors that might contribute to those problems, and pollution control actions. Although the information presented is not sufficiently detailed for site-specific decisions, e.g., writing NPDES permits, it is useful for setting regional priorities for more detailed studies, or for immediate management action.

Pollutants and Source Categories

Pollutants. The toxic pollutants for which discharge estimates are presented are shown in Table 5.1. The estimates are taken from NOAA's NCPDI. Estimates have been made for each of the metals shown and for two categories of compounds: petroleum and chlorinated hydrocarbons. No distinction is made between individual compounds in these categories. For example, no individual discharge estimates are made for any of the six pesticides that are listed under chlorinated hydrocarbons.

Although the eight metals and two pollutant categories represent only a fraction of the 129 toxic pollutants on EPA's Priority Pollutant List (PPL), they may provide an overview of the geographic scale and scope of toxic discharges throughout the region. For example, of the 15 metals and inorganic compounds on the PPL, individual discharge estimates are given for eight in the NCPDI. These estimates do not account for variable forms of these eight metals. While the PPL specifies 18 individual chlorinated hydrocarbon pesticides (CHPs), the NCPDI provides group estimates for a set of six. In

Table 5.1 Toxic pollutants with discharge estimates from the NCPDI.

Pollutants		Definition
1. Heavy Metals		
a. Copper	(Common Metals)	A group of elements present in the environment from natural and anthropogenic sources that can produce toxic effects; determination based on EPA standard methods that measure environmentally available "metals."
b. Iron		
c. Zinc		
d. Arsenic	(Trace Metals)	
e. Cadmiun		
f. Chromium		
g. Lead		
f. Mercury		
2. Petroleum Hydrocarbons		A mixture of oil and grease comprised of hundreds of compounds.
3. Chlorinated Hydrocarbons		Includes chlorinated pesticides, other than polychlorinated biphenyls aromatics and nonaromatics.
a. Kelthane		
b. Lindane		
c. Toxaphene		
d. Endrin		
e. Endosulfan		
f. Methoxychlor		

addition, the PPL names 71 individual compounds as petroleum hydrocarbons. Discharge estimates of these compounds are made for this category of pollutants as an entire group and not as individual compounds. Six phthalate esters, seven nitrosamines, and miscellaneous compounds are also included on the PPL, but are unaccounted for in the NCPDI estimates.

Common metals are treated separately from trace metals because they occur naturally in significantly larger amounts and because toxicity levels generally are lower than for trace metals. Mercury estimates are separated from both groups of metals since mercury discharges occur in small amounts relative to other metals. No estimates are made for polychlorinated biphenyls (PCBs), a chlorinated hydrocarbon, because PCB discharges are typically random and enter stormwater from leaking electrical capacitors and transformers. In the case of chlorinated hydrocarbons, most of the pollutants for which discharges are estimated have been restricted in their use or replaced by other compounds.

The classes of toxic materials identified at NPL sites are shown in Table 5.2. Crude estimates of the amount of these compounds at each site are presented. No estimates of the quantity discharged from a site are presented. The presence of these compounds at a site is determined from samples of soil, groundwater, and surface water. Samples are analyzed for a subset of individual chemical elements and compounds that fall into the classes listed in the PPL. Generally, no sampling is done for specific forms of chemical elements. The quantity of toxic materials in NPL sites is given as a range of values (Appendix 5, Table 18), often for more than one type of toxic waste.

Source Categories. Estimates of toxic pollutant discharges are presented for five major source categories: (1) wastewater treatment plants (WWTPs); (2) industrial facilities; (3) steam-generated electric power plants; (4) combined sewer overflows (CSOs); and (5) upstream discharge to coastal counties. The first three categories are clearly point source dischargers, the majority of their discharge going directly to coastal waters. CSOs typically enter a waterbody at a single point, but collect nonpoint urban runoff discharges. Upstream sources include pollutants associated with discharges occurring upstream of coastal counties. Estimates are not presented for nonpoint sources. Nevertheless, nonpoint source discharge estimates are available in the NCPDI, and agricultural nonpoint runoff can be a major source of toxic pesticide discharges. Their contribution to overall toxic pollutant discharges in coastal areas is currently under study in a separate NOAA/EPA project.

Wastewater Treatment Plants (WWTPs). Included in the region are 201 WWTPs of which 187 are publicly owned municipal facilities that account for 99.7 percent of the flow from WWTPs. Typically, WWTPs are designed primarily to remove conventional pollutants, such as biochemical oxygen demanding materials, suspended solids, and in some cases, nutrients from domestic wastewater. Although many toxic wastes from domestic and industrial sources are also discharged to WWTPs, these wastes are only treated incidentally.

Industrial Facilities. This category includes estimates for 376 direct discharging industrial facilities in 17 industrial categories and 44 subcategories (Table 5.3). All facilities in these categories with an NPDES permit are included.

Table 5.2 Classes of Toxic Materials Identified at NPL Sites

1. Metals and Inorganics
2. Pesticides
3. Polychlorinated Biphenyls
4. Nonaromatic Hydrocarbons
5. Monocyclic Hydrocarbons
6. Polycyclic Hydrocarbons
7. Other Oxygenated Organics
8. Other

Table 5.3 Industrial Categories, Subcategories, and SIC Codes

Categories	Subcategories	SIC Codes
1. Textile Manufacturing	Wool, low water use	2211,21,41 2295,96,98
	Wool finishing	2231
	Knit fabric finishing	2251-54 2257-59,92
	Woven fabric finishing	2261,62
	Stock and yarn	2269
	General textile mfg.	2311-99, 2281-84 2293,94
	Carpet finishing	2271,72,79
	Felted fabrics	2291
	Non-woven mfg.	2297
	Wool scouring	2299
2. Timber Products	Sawmills	2411-29, 2261
	Plywood	2431-99 2511,12,17, 21,31 2541,91,99
3. Pulp and Paper		2611-55
4. Printing and Publishing		2711-95
5. Chemical Products	Inorganic Chemicals	2812,13,16, 19,92, 99, 3274
	Organic Chemicals	2821,23,24 2851,65,93 3955,52,53, 7535
	Pharmaceuticals	2831,33,34
	Soaps and Detergents	2841-44
	Pesticides	2869,79
	Adhesives & Sealants	2891
6. Petroeum Refining		2911,92,99
7. Tire and Inner Tube		3011
8. Rubber Processing		2822,3021, 31,41,69, 3293, 7534
9. Glass Manufacturing		3211,21,29, 3231

Table 5.3 Industrial Categories, Subcategories, and SIC Codes

Categories	Subcategories	SIC Codes
10. Iron and Steel		3312,15, 16,17
11. Foundries		3321-25,61, 62,69
12. Nonferrous Metals	Primary nonferrous	3331-39
	Secondary nonferrous	3341
	Copper forming	3351
	Aluminum forming	3353-55
	Nonferrous forming	3356,57,63
13. Primary Metal Products		3399
14. Fabricated Metal Products	Can Making	3411
	Plumbing, Hardware	3421,23,25, 29,32,33, 41,42
	Structural	3443-49
	Screw Machine Products	3451,52
	Forgings & Stampings	3462,65, 66,69
	Plating & Polishing	3471
	Coil Coating	3479,97
	Small Arms	3482-89
	Miscellaneous	3493-96, 98,99
15. Machinery	General	3511-99
16. Misc. Mfg.	Instruments	3811-73
	Jewelry, Silver, Musical	3914,15,31
	Toys, Costume Jewelry	3944,49,61, 63,64, 93,95, 99
17. Electric & Electronics	Power Transformers	3612,77
	Electronic Components	3624,41,71, 72,74,76,79, 99
	Distribution & Industrial	3613,21,33
	Lighting and Wiring	3643-48
	Miscellaneous	3691,92
18. Transportation	Motor Vehicles, Aircraft	3711-28
	Shipbuilding & Repairing	3731,32
	Railroads	3743-99

Table 5.4 Toxic Pollutant Discharges to Northeast Estuaries - circa 1982

DRAFT 11/87

Estuary	Number of facilities (1)				Common Metals (2)					Trace Metals (3)					Mercury				
					Percent of Total					Percent of Total					Percent of Total				
	Industry	Power Plants	STPs	CSOs	Industry	Power Plants	STPs	CSOs	Total (t/yr)	Industry	Power Plants	STPs	CSOs	Total (t/yr)	Industry	Power Plants	STPs	CSOs	Total (lbs/yr)
Passamaquoddy Bay	2	0	6	2	12	0	1	87	**163**	42	0	0	58	**12**	51	0	3	46	**39**
Englishman Bay	1	1	1	1	0	0	0	100	**6**	0	0	0	0	**0**	0	0	50	50	**2**
Narraguagus Bay	0	0	1	0	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Blue Hill Bay	0	0	2	0	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Penobscot Bay	4	0	11	3	25	0	16	58	**55**	50	0	0	50	**2**	63	0	22	15	**27**
Muscongus Bay	3	0	5	1	0	0	100	0	**1**	0	0	0	0	**0**	17	0	83	0	**6**
Sheepscot Bay	3	2	7	3	2	0	10	88	**60**	0	0	0	100	**2**	9	0	27	64	**11**
Casco Bay	7	3	17	3	7	1	22	71	**198**	14	0	29	57	**14**	23	0	46	30	**56**
Saco Bay	5	0	10	1	2	0	25	73	**52**	0	0	0	100	**2**	0	0	64	36	**14**
Great Bay	9	3	19	6	16	1	19	63	**158**	22	0	22	56	**9**	44	0	33	23	**52**
Merrimack River	26	0	7	2	2	0	46	52	**375**	0	0	54	46	**24**	6	0	71	18	**131**
Boston Bay	37	5	9	5	4	0	45	51	**2,543**	8	0	50	42	**167**	16	0	67	17	**919**
Cape Cod Bay	0	2	2	0	0	27	73	0	**11**	0	0	0	0	**0**	0	0	100	0	**4**
Buzzards Bay	14	1	3	1	1	0	50	49	**171**	0	0	58	42	**12**	8	0	81	11	**62**
Narragansett Bay	96	7	25	2	2	1	51	47	**742**	13	0	53	34	**53**	23	0	62	15	**287**
Gardiners Bay	0	0	4	0	0	0	100	0	**2**	0	0	0	0	**0**	0	0	100	0	**1**
Long Island Sound	169	15	72	14	1	2	63	34	**2,429**	3	0	72	25	**181**	1	0	92	7	**4,466**
Total	376	39	201	44	3	1	49	47	**6,966**	7	0	56	37	**478**	6	0	84	10	**6,077**

Abbreviations: Sewage Treatment Plants, STPs; Combined Sewer Overflows, CSOs; tons, t; pounds, lbs; year, yr.

(1) Number of industrial facilities represents those in SIC codes specified in Table 5.3; where available, discharges from upstream sources are given in the appendix.

(2) Common metals include copper, iron, and zinc.

(3) Trace metals include arsenic, cadmium, chromium, and lead.

Estuary	Number of facilities (1)				Petroleum Hydrocarbons (2)					CHPs (3)				
					Percent of Total					Percent of Total				
	Industry	Power Plants	STPs	CSOs	Industry	Power Plants	STPs	CSOs	Total (t/yr)	Industry	Power Plants	STPs	CSOs	Total (t/yr)
Passamaquoddy Bay	2	0	6	2	0	0	17	83	**220**	0	0	0	100	**2**
Englishman Bay	1	1	1	1	0	0	58	42	**19**	0	0	0	0	**0**
Narraguagus Bay	0	0	1	0	0	0	0	0	**0**	0	0	0	0	**0**
Blue Hill Bay	0	0	2	0	0	0	100	0	**8**	0	0	0	0	**0**
Penobscot Bay	4	0	11	3	0	0	80	20	**206**	0	0	100	0	**3**
Muscongus Bay	3	0	5	1	0	0	100	0	**27**	0	0	100	0	**8**
Sheepscot Bay	3	2	7	3	1	0	59	40	**167**	0	0	0	100	**1**
Casco Bay	7	3	17	3	0	0	81	19	**932**	0	0	86	14	**14**
Saco Bay	5	0	10	1	3	0	81	16	**305**	0	0	100	0	**2**
Great Bay	9	3	19	6	2	0	79	19	**675**	0	0	67	33	**3**
Merrimack River	26	0	7	2	2	0	91	7	**3,503**	0	0	0	100	**2**
Boston Bay	37	5	9	5	0	0	93	7	**24,879**	35	0	4	61	**26**
Cape Cod Bay	0	2	2	0	0	0	100	0	**144**	0	0	0	0	**0**
Buzzards Bay	14	1	3	1	0	0	95	5	**1,837**	0	0	0	100	**1**
Narragansett Bay	96	7	25	2	3	0	91	6	**7,570**	0	0	0	100	**4**
Gardiners Bay	0	0	4	0	0	0	100	0	**24**	0	0	0	0	**0**
Long Island Sound	169	15	72	14	0	1	94	5	**20,644**	0	0	0	0	**0**
Total	376	39	201	44	1	<1	92	7	**61,160**	14	0	42	44	**66**

Abbreviations: Chlorinated Pesticides other than polychlorinated biphenyls; Sewage Treatment Plants, STPs; Combined Sewer Overflows, CSOs; tons, t; pounds, lbs; year, yr.

(1) Number of industrial facilities represents those in SIC codes specified in Table 5.3; where available, discharges from upstream sources are given in the appendix.

(2) Includes hundreds of compounds measured as oil and grease.

(3) Includes six pesticides--kelthane, lindane, toxaphene, endrin, endosulfan, and methoxychlor.

Table 5.5 Predominant Industrial Dischargers of Toxic Pollutants to Northeast Estuaries - circa 1982 (1)

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Estuary	Industrial Category or Subcategory	Percent of Total Annual Industrial Discharge (2)					
		Waste Water	Common Metals	Trace Metals	Mercury	Pet. HCs	CHPs
Passamaquoddy Bay							
	Pulp and Paper	84	63	60	55	0	0
	Sawmills	16	37	40	45	100	0
	TOTAL	**16.6**	**19**	**5**	**20**	**1**	**0**
Englishman Bay							
	Wool, low water use	100	0	0	0	0	0
	TOTAL	**0.0002**	**0**	**0**	**0**	**0**	**0**
Narraguagus Bay							
	TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Blue Hill Bay							
	TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Penobscot Bay							
	Pulp and Paper	81	64	100	53	0	0
	Pharmaceuticals	13	29	0	35	0	0
	Inorganic Chemicals	5	7	0	12	0	0
	TOTAL	**13.5**	**14**	**1**	**17**	**0**	**0**
Muscongus Bay							
	Inorganic Chemicals	83	0	0	100	0	0
	Electronic Components	17	0	0	0	0	0
	TOTAL	**0.083**	**0**	**0**	**1**	**0**	**0**
Sheepscot Bay							
	Pulp and Paper	94	100	0	100	0	0
	Timber Products	1	0	0	0	100	0
	TOTAL	**1.27**	**1**	**0**	**1**	**1**	**0**
Casco Bay							
	Pulp and Paper	99	100	100	100	0	0
	TOTAL	**10.7**	**13**	**2**	**13**	**0**	**0**
Saco Bay							
	Ordnance	80	100	0	0	100	0
	Woven Fabric Finishing	11	0	0	0	0	0
	TOTAL	**0.21**	**1**	**0**	**0**	**8**	**0**
Great Bay							
	Shipbuilding and Repairing	66	88	100	91	86	0
	Power Transformers	11	4	0	4	0	0
	Motor Vehicles, Aircraft	7	4	0	4	14	0
	Pulp and Paper	9	0	0	0	0	0
	Wool, low water use	3	4	0	0	0	0
	TOTAL	**2.65**	**26**	**2**	**23**	**14**	**0**
Merrimack River							
	Pulp and Paper	57	33	0	25	0	0
	Foundries, Non-ferrous	19	33	0	38	0	0
	Rubber Processing	10	17	0	13	9	0
	Telephone & Telegraph Equipment	5	17	0	0	15	0
	Non-ferrous metal forming	3	0	0	0	4	0
	Organic Chemicals	2	0	0	25	6	0
	Wool Scouring	1	0	0	0	63	0
	TOTAL	**4.27**	**6**	**0**	**8**	**54**	**0**

Abbreviations: Petroleum Hydrocarbons, Pet. HCs; Chlorinated Hydrocarbons other than polychlorinated biphenyls, CHPs.

(1) Dischargers that account for 90 percent or greater of total industrial loads for each of wastewater, metals, petroleum hydrocarbons and chlorinated hydrocarbons.

(2) Discharges are billion gallons/day for wastewater; tons/year for common and trace metals, petroleum and chlorinated hydrocarbons; pounds/year for mercury.

Table 5.5 continued. Predominant Industrial Dischargers of Toxic Pollutants to Northeast Estuaries - circa 1982 (1)

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Estuary	Industrial Category or Subcategory	Percent of Total Annual Industrial Discharge (2)					
		Waste Water	Common Metals	Trace Metals	Mercury	Pet. HCs	CHPs
Boston Bay							
	Machinery, General	71	63	85	73	84	0
	Hardware, Plumbing	15	13	15	11	0	0
	Shipbuilding and Repairing	3	15	0	9	16	0
	Inorganic Chemicals	3	2	0	3	0	0
	Pesticides	0	0	0	0	0	100
	TOTAL	**32.5**	**97**	**13**	**46**	**49**	**9**
Cape Cod Bay							
	TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Buzzards Bay							
	Wool, low water use	55	100	0	60	0	0
	Toys, Costume Jewelry	14	0	0	20	0	0
	Iron and Steel	10	0	0	20	0	0
	Copper Forming	9	0	0	0	50	0
	Electronic Components	8	0	0	0	25	0
	Rubber Processing	1	0	0	0	25	0
	TOTAL	**1.71**	**2**	**0**	**5**	**0**	**0**
Narragansett Bay							
	Organic Chemicals	43	36	86	85	57	0
	Electrical Distributing Equipment	7	14	14	2	4	0
	Pulp and Paper	7	7	0	2	0	0
	Woven fabric finishing	5	7	0	3	10	0
	Pharmaceuticals	6	0	0	2	0	0
	Non-ferrous metal forming	4	7	0	0	3	0
	Rubber Processing	7	7	0	3	0	0
	Coil Coating	2	21	0	0	3	0
	Stock and Yarn	3	0	0	2	17	0
	TOTAL	**6.23**	**14**	**7**	**66**	**202**	**0**
Gardiners Bay							
	TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Long Island Sound							
	Pharmaceuticals	61	83	75	81	0	0
	Motor Vehicles, Aircraft	12	6	13	0	0	0
	Pulp and Paper	7	0	0	0	0	0
	Organic Chemicals	4	0	0	0	0	0
	Iron and Steel	3	0	0	0	5	0
	Copper Forming	2	0	0	2	14	0
	Rubber Processing	2	0	0	0	2	0
	Instruments	1	0	0	14	7	0
	Coil Coating	1	6	0	0	18	0
	Electronic Components	1	0	0	2	7	0
	Non-ferrous Metal Forming	1	6	0	0	7	0
	Plating and Polishing	1	0	0	0	5	0
	Machinery, General	0	0	13	0	2	0
	Metal Forging and Stamping	0	0	0	0	14	0
	Hardware, Plumbing	0	0	0	0	7	0
	Screw Machine Products	0	0	0	0	4	0
	TOTAL	**35**	**36**	**8**	**58**	**56**	**0**

Abbreviations: Petroleum Hydrocarbons, Pet. HCs; Chlorinated Hydrocarbons other than polychlorinated biphenyls, CHPs.

(1) Dischargers that account for 90 percent or greater of total industrial loads for each of wastewater, metals, petroleum hydrocarbons and chlorinated hydrocarbons.

(2) Discharges are billion gallons/day for wastewater; tons/year for common and trace metals, petroleum and chlorinated hydrocarbons; pounds/year for mercury.

Steam-Generated Electric Power Plants. This category includes 43 fossil fuel and nuclear-powered electric generating facilities that primarily discharge cooling waters. No hydro-electric facilities are included. Power plants are presented separately from industrial facilities because of their large cooling water discharges. Most facilities in the study area use a once-through cooling process. The toxic pollutants most frequently found in cooling water are heavy metals from copper alloy condenser tubing and plant piping.

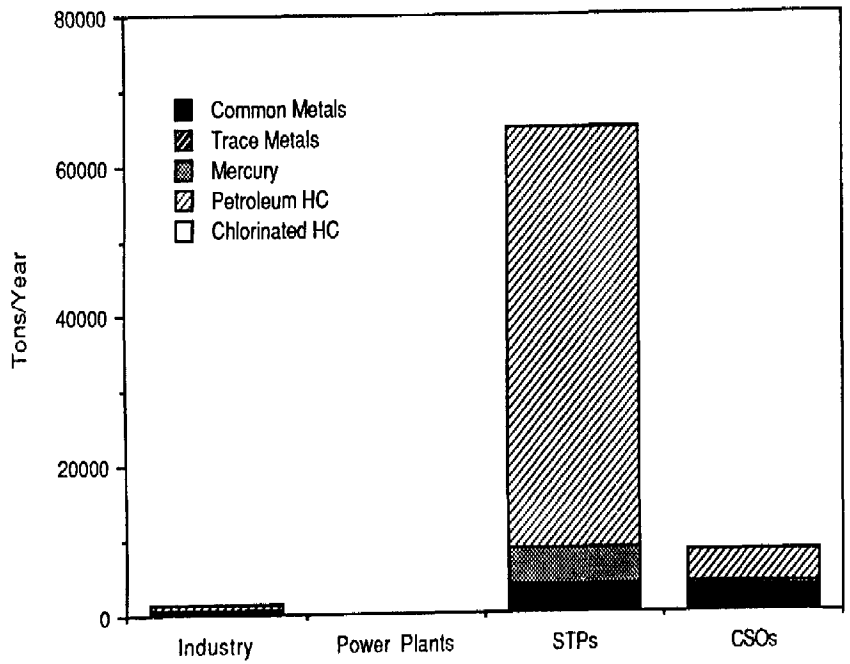
Combined Sewer Overflows (CSOs). This category includes CSOs for 44 urban areas discharging untreated mixtures of urban stormwater runoff and domestic sewage directly to coastal waters. Overflows occur intermittently when the hydraulic capacity of a sewer system is exceeded, usually as the result of heavy precipitation. Combined means that the sewer system combines both stormwater runoff and domestic sewer flow in the same pipes.

In the NCPDI, each CSO represents a number of urban areas, not just a city proper or a single municipality. Many urban areas have separate sanitary and storms sewers. However, CSO is a major problem in many older urban areas, such as those of the Northeast, where aging sewage systems cannot accommodate increased domestic sewage and runoff caused by urban growth.

Upstream Sources. This category includes rivers and streams entering coastal counties with a long-term flow of greater than 1,000 cubic feet per second. Upstream sources aggregate all point and nonpoint source discharges upstream of where they enter a coastal county. Seven estuarine drainage areas (EDAs) fall entirely within coastal counties in the region and ten extend beyond. Of these ten, no discharge is reported for five because of the absence of any monitored data. There were no useable monitoring data for CHPs.

Sources Not Included. No estimates of toxic pollutant discharges are made for nonurban, nonpoint source runoff. Levels of heavy metals from this source are considered to be background levels in soil. Except for the occasional oil or hazardous waste spill, petroleum hydrocarbons generally are not contributed from this category. As mentioned above, agricultural nonpoint sources are also not included.

Figure 5.4 Toxic Pollutant Discharges by Source for Northeast Region



Estimation Methods and Data Sources

The same method is used to estimate pollutant discharges for the three point source categories. Pollutant discharges are computed by multiplying a flow estimate by an estimate of the pollutant concentration carried in that flow. The difference in estimation methods between source categories lies in how the estimates of flow and pollutant concentration are derived. For example, for point sources and CSO, estimates are based almost entirely on "typical" concentration values. This is because little site-specific monitored data are available for these sources. Whereas for upstream sources, monitored data for toxic metals are available from a USGS water quality monitoring station network, and used to estimate pollutant discharge.

Point Sources. Although some minor differences exist between WWTPs and industrial facilities, the four major steps in estimating discharges from both are the same:

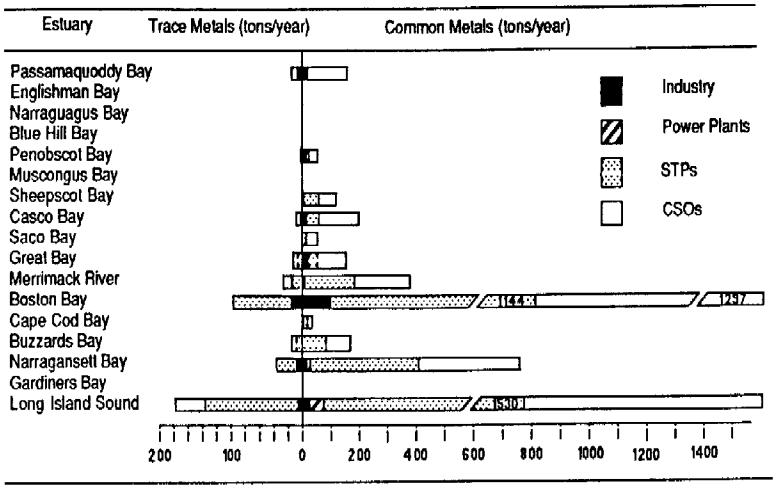
1. The type of facility is determined. If a WWTP, the level of treatment (primary or secondary) is identified. If an industrial facility, the industrial category into which the facility falls is identified. In the NCPDI, every industrial facility has been classified into one of 84 industrial categories based on the facility's Standard Industrial Classification (SIC) code;

2. For each facility, the daily volume and type or types of wastewater discharge (process wastewater, cooling water, or a combination of the two) is identified.

3. Daily flow is converted to annual flow by multiplying the daily flow (assumed for the type of facility) by the number of operating days per year. For example, a WWTP is assumed to operate 365 days per year while a metal finishing facility is assumed to operate 260 days per year;

4. The annual load is computed for each wastestream (process, cooling, or a combination) by multiplying its flow by the concentration of the pollutants that are assumed to be "typically" present in the

Figure 5.5 Trace metal and common metal discharges by source and estuary



wastestream of that type of facility. For example, a WWTP at secondary treatment would be assigned pollutant concentrations typical of secondary-treated wastewater; a process wastewater pipe from an iron and steel manufacturing facility would be assigned average concentrations of pollutants typically found in discharges from iron and steel plants; and a cooling water pipe would receive pollutant concentrations typically found in recycled cooling water.

(A recent NOAA study of Long Island Sound showed that most facilities still only monitor for conventional pollutants and that little monitored data are actually available to improve concentration estimates for the toxic pollutants considered.)

Flow data estimates were obtained from several sources. For facilities that discharge to Long Island Sound, flow estimates were taken directly from Discharge Monitoring Reports (DMRs); for all other facilities, from state data bases listing DMR flow values. Or, if a state data base were not available, from Federal data bases listing either NPDES permitted flow, design flow, or estimated average flow values for a facility. For publicly owned WWTPs, the Federal data base used was the 1982 EPA Construction Grants Needs Survey. For industrial facilities (including steam-generated power plants), the Federal data bases used were EPA's Permit Compliance System (PCS) and the Industrial Facilities Discharge (IFD) file.

Typical pollutant concentration values were also derived from several sources. For WWTPs, values were obtained from three sources: 1) EPA's Forty-City Study that presents data on the occurrence and fate of conventional and toxic pollutants collected from 1978 to 1980 for 50 WWTPs; 2) EPA's Four-City Study that presents pollutant concentrations from residential, commercial, and industrial sources; and 3) information supplied by EPA's Municipal Environmental Research Laboratory (MERL).

For industrial facilities, typical pollutant discharge concentrations for each industrial category were obtained primarily from the EPA industry status sheets of effluent characteristics for selected industrial point source categories (EPA, Office of Water Regulations and Standards, 1986). For industrial categories not covered in the status sheets, typical concentration values were derived from EPA Effluent Guideline Development Documents, studies of specific industrial categories, and concentration estimates developed by NOAA based on a survey of DMR data for facilities in an industrial category. More detailed information and references on how the industrial discharge estimates were derived is provided in a recent NOAA report on the development of the typical industrial discharge concentrations (Arnold et al., 1987).

Pollutant discharge estimates from steam-generated power plants are aggregated separately because of the very large volume of cooling water they discharge. Because most of the power plants in the region use once-through cooling, a separate set of typical concentrations for once-through cooling was used. These typical concentration estimates were based on values reported in the literature for power plant discharges, and are restricted to estimates for copper that are eroded from the copper alloy condenser cooling tubes (Waslenchuck, et al., 1982).

Detailed descriptions of the estimation methods and data sources for each of the NCPDI source categories discussed can be found in the NCPDI Methods Documents available from NOAA's Strategic Assessment Branch (1984).

Combined Sewer Overflows (CSO) Discharge estimates for CSOs are computed by multiplying the estimated volume of overflow by the typical pollutant concentrations. To estimate the volume of overflow for any given rainfall event, the volume of stormwater runoff generated over the urban area served by combined sewers is estimated from a runoff simulation model using local precipitation records for the base year. This volume of stormwater is compared to the hydraulic capacity of the WWTP receiving the combined stormwater/ wastewater flow. Stormwater in excess of the amount that can be accommodated by the hydraulic capacity of the WWTP is considered to be the overflow volume. This means that CSOs discharging to WWTPs with large excess hydraulic capacities may overflow small volumes of combined stormwater flow, while a CSO system discharging to a WWTP with small excess capacity will bypass relatively large volumes. Estimates of typical CSO pollutant concentrations are averages developed by NOAA from values reported in the literature for CSOs in various parts of the country.

Upstream Sources. Estimates of discharges from upstream sources entering coastal counties are made by estimating the stream flow at the coastal county boundary and multiplying it by average pollutant concentrations compiled from water quality monitoring stations on the river. Only the Merrimack River had useable estimates for

Table 5.6 CERCLIS Sites by Estuarine Drainage Area (EDA) and Counties within EDAs

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Estuary	Counties in EDA	Coastal County	Non-Coastal County	CERCLIS Sites NPL	CERCLIS Sites Non-NPL
Passamaquoddy Bay	Aroostook, ME.		•	0	0
	Hancock, ME.	•		0	0
	Penobscot, ME.		•	0	0
	Washington, ME.	•		0	3
Englishman Bay	Hancock, ME.	•		0	0
	Washington, ME.	•		0	0
Narragansus Bay	Hancock, ME.	•		0	0
	Washington, ME.	•		0	0
Blue Hill Bay	Hancock, ME.	•		0	0
	Penobscot, ME.		•	0	0
Penobscot Bay	Aroostook, ME.		•	0	0
	Hancock, ME.	•		0	1
	Knox, ME.	•		0	1
	Penobscot, ME.		•	0	3
	Piscataquis, ME.		•	0	0
	Waldo, ME.	•		0	2
Muscongus Bay	Knox, ME.	•		0	2
	Lincoln, ME.	•		0	1
	Waldo, ME.	•		0	0
Sheepscot Bay	Androscoggin, ME.		•	0	11
	Cumberland, ME.	•		0	1
	Franklin, ME.		•	0	1
	Kennebec, ME.		•	2	5
	Knox, ME.	•		0	0
	Lincoln, ME.	•		0	0
	Oxford, ME.		•	0	3
	Penobscot, ME.		•	0	2
	Piscataquis, ME.		•	0	0
	Sagadahoc, ME.	•		0	2
	Somerset, ME.		•	0	2
	Waldo, ME.	•		0	0
	Carroll, NH.		•	0	0
	Coos, NH.		•	0	0
Casco Bay	Androscoggin, ME.		•	0	2
	Cumberland, ME.	•		1	12
	Oxford, ME.		•	0	0
	Sagadahoc, ME.	•		0	0
	York, ME.	•		0	1
Saco Bay	Cumberland, ME.	•		0	0
	Oxford, ME.		•	0	0
	York, ME.	•		1	9
	Carroll, NH.		•	1	0
	Coos, NH.		•	0	0
	Grafton, NH.		•	0	0
Great Bay	York, ME.	•		0	7
	Carroll, NH.		•	0	0
	Rockingham, NH.	•		3	8
	Strafford, NH.	•		3	10
Merrimack River	Essex, MA.	•		2	28
	Middlesex, MA.	•		5	74
	Worcester, MA.		•	1	2
	Belknap, NH.		•	0	2
	Carroll, NH.		•	0	0
	Grafton, NH.		•	0	0
	Hillsborough, NH.		•	2	48
	Merrimack, NH.		•	0	12
	Rockingham, NH.	•		2	15
	Strafford, NH.	•		0	0
Boston Bay	Essex, MA.	•		0	12
	Middlesex, MA.	•		2	69
	Norfolk, MA.	•		2	37
	Plymouth, MA.	•		0	2
	Suffolk, MA.	•		0	27
	Worcester, MA.		•	0	0
Cape Cod Bay	Barnstable, MA.	•		0	11
	Plymouth, MA.	•		1	5
Buzzards Bay	Barnstable, MA.	•		0	0
	Bristol, MA.	•		3	39
	Plymouth, MA.	•		0	0
Narragansett Bay	Bristol, MA.	•		1	29
	Norfolk, MA.	•		0	1
	Plymouth, MA.	•		1	10
	Bristol, RI	•		0	7
	Kent, RI.	•		1	33
	Newport, RI.	•		0	29
	Providence, RI.	•		1	53
	Washington, RI.	•		0	32
Gardiners Bay	Suffolk, NY.	•		1	14
Long Island Sound	Fairfield, CT.	•		1	67
	Hartford, CT.		•	2	29
	Litchfield, CT.		•	0	16
	Middlesex, CT.	•		0	29
	New Haven, CT.	•		2	86
	New London, CT.	•		0	16
	Tolland, CT.		•	0	11
	Windham, CT.		•	1	31
	Berkshire, MA.		•	1	11
	Hampden, MA.		•	0	17
	Worcester, MA.		•	0	9
	Bronx, NY.	•		0	4
	Colombia, NY.	•		0	0
	Dutchess, NY.	•		1	9
	Nassau, NY.	•		2	3
	Putnam, NY.	•		0	0
	Queens, NY.	•		0	5
	Suffolk, NY.	•		0	12
	West Chester, NY.	•		0	4
	Kent, RI.		•	0	0
	Providence, RI.	•		0	0
TOTAL Sites				48	1039

Abbreviations: Comprehensive Environmental Response, Compensation, and Liability Information System, CERCLIS; Estuarine Drainage Area, EDA; National Priority List, NPL

Table 5.7 National Priority List (NPL) Sites by Estuary

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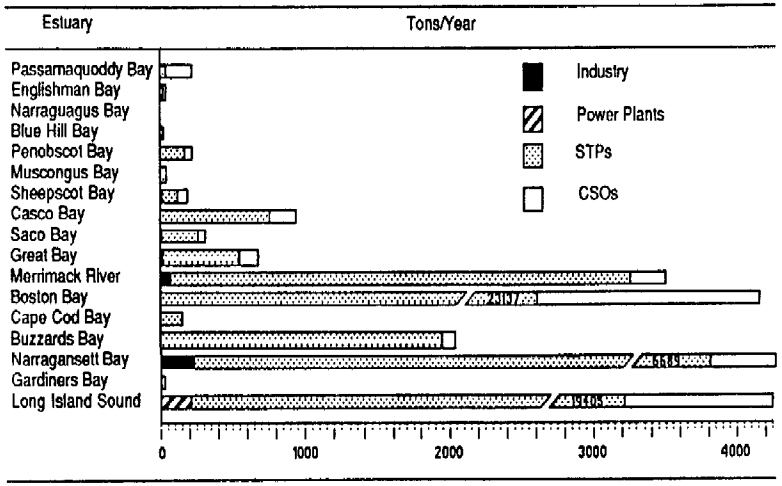
Estuary	Number	Type							Release to Surface Water		Quantity of Waste (tons) (1)					Types of Waste								
		Land Fill	Surface Impound.	Open Dump	Con-tainers	Mining/ Mfg.	Incinera-tion	Waste Oil/ Solv.Recov.	Known	Unknown	<500	500-2500	2501-10,000	10,000 - 125,000	>500,000	Metals/ Inorganics	Pesticides	PCBs	Nonarom. Hydrocarb.	Monocyclic Hydrocarb.	Polycyclic Hydrocarb.	Other Oxygenated Organics	Other
Passamaquoddy Bay	0																						
Englishman Bay	0																						
Narragansus Bay	0																						
Blue Hill Bay	0																						
Penobscot Bay	0																						
Muscongus Bay	0																						
Sheepscot Bay	2	•	•	•	•			•	•	•	•							•	•	•			
Casco Bay	1		•		•	•	•		•			•						•	•				
Saco Bay	2	•	•	•		•			•	•				•		•			•	•			
Great Bay	6	•	•		•	•	•		•				•			•		•	•	•		•	•
Merrimack River	12	•	•	•	•	•	•	•	•	•				•		•	•	•	•	•	•	•	•
Boston Bay	4		•			•			•			•				•	•	•	•	•			
Cape Cod Bay	1				•					•			•						•	•		•	
Buzzard's Bay	3	•	•	•				•	•				•					•	•	•			
Narragansett Bay	4	•		•	•	•	•	•	•					•		•			•	•		•	
Gardiners Bay	1	•											NA			•							
Long Island Sound	10	•	•	•	•	•	•	•	•	•					•			•	•	•		•	•
Regional Total	46																						

• denotes presence

Abbreviations: Impoundment, Impound.; Manufacturing, Mfg.; Solvent Recovery, Solv. Recov.; Polychlorinated Biphenyls, PCBs; Nonaromatic Hydrocarbons, Nonarom. Hydrocarb.; Not Available, NA.

(1) Quantity of waste does not include amounts of contaminated soil or water or contained substances that are at low risk for escape into the environment. Common units were obtained as follows: one ton = one cubic yard = four 55-gallon drums.

Figure 5.6 Petroleum hydrocarbon discharges by source and estuary



petroleum hydrocarbons, and there were no useable monitoring data for CHPs. Therefore, only estimates for metal loads are made for this source category. Stream discharge data were obtained from annual USGS State Water Resources Data Reports (USGS, 1983). Ambient water quality data were obtained from EPA's STORET data base that includes water quality data from the USGS NASQAN network and other USGS water quality monitoring stations. If data from STORET for a pollutant were inadequate, or not available, additional monitoring data were obtained from state data bases.

Hazardous Waste Sites. Data for this category were obtained primarily from EPA's Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS). In addition to CERCLIS, more detailed information on individual National Priority List (NPL) sites was obtained from the EPA NPL Data File (as of January 20, 1984). This data base contains information on the type of disposal, the actual chemicals present, the quantity of waste, and the overall rank and scores of each site. Additional information on waste characteristics and quantity was also obtained from NOAA's *Preliminary Inventory of Hazardous Waste Disposal Sites in the Nation's Coastal Zone* (February 1984).

For NPL sites designated since January 1984, similar, though sometimes incomplete, information on NPL score and waste characteristics was obtained from EPA's *Selected Substances of Concern at Final and Proposed NPL Sites* (July 27, 1987). Finally, for a few sites, this information was obtained directly from the raw site inspection data. In some cases, information on waste quantity could not be determined.

Data Organization and Presentation

Point Sources. Discharge estimates are organized by estuarine drainage area (EDA) for the Northeast. Several estuaries in the region (Long Island Sound, Narragansett Bay, and the Merrimack River) have EDA boundaries that are congruent with the boundaries of USGS catalog units. In these cases, the NCPDI discharges already available by USGS hydrologic catalog unit were simply aggregated. However, for the other estuaries, the EDA boundary bisected catalog unit boundaries so that it consisted of portions of catalog units. For these estuaries, individual facilities were first located in the appropriate EDA and their individual loadings were compiled.

In addition to mapping facilities and compiling discharge estimates by EDA, the discharges were further aggregated into industrial categories and subcategories. The discharges for each estuary by industrial categories and subcategories, as well as by individual pollutant, are contained in the appendices. The appendices also contain information on upstream sources and the number of major and minor facilities for each of the industrial categories, and publicly and privately owned WWTPs.

Table 5.4 presents total toxic discharges by estuary for each of the five major pollutant groupings. The relative discharges are also shown as a percent of the total for each of four source categories: total industry, power plants, sewage treatment plants (both public and private), and CSOs. Figures 5.4-5.6 show the magnitude of the discharges from each of the four source categories for each of the five pollutant groups. Figure 5.4 shows the total toxic pollutant loadings by source, as well as the discharges of individual pollutants from each source for the entire region. Finally, the industrial categories, which account for the majority (90 percent or more) of the total industrial load of wastewater and pollutants, are shown for each of the 17 estuaries in the region.

Hazardous Waste Sites. Hazardous waste sites also had to be mapped for the appropriate EDAs. Both the CERCLIS and the NPL sites were mapped by comparing site location information (either city or latitude/longitude) with USGS maps and maps of EDAs in Volume I of NOAA's *National Estuarine Inventory (NEI)*. Hazardous waste sites were also organized by counties within EDAs. Information on the number of NPL and non-NPL sites within each coastal and noncoastal county in each EDA is shown in Table 5.6. The location of NPL sites and the relative numbers of all CERCLA sites (both NPL and non-NPL) in the 17 estuaries are shown in Figures 5.2 and 5.3.

Actual chemicals detected at NPL sites were categorized into eight major groups of chemicals: metals/inorganics, pesticides, PCBs, nonaromatic hydrocarbons, monocyclic hydrocarbons, polycyclic hydrocarbons, other oxygenated organics, and others not falling into these categories. The actual quantity of waste was either available in the NPL data bases or reported as a range in NOAA's NEI report (1984). The total quantity and type of waste at all NPL sites within an estuary, along with the type of site and surface water scores, are

Table 5.8 Data Quality for Point Sources DRAFT 11/87

Data Elements	Data Quality Good	Moderate	Poor	Comments
Location	•			Comprehensive inventory of NPDES permitted facilites
Industry Type	•			Identified on NPDES permit
Wastewater Discharge	•			Usually measured data available
Pipe Type	•			Specified on the permit
BOD, TSS concentrations	•	•		Often specified on the permit
Other NCPDI pollutant concentrations	•	•	•	Often not available with permit
Typical Industrial concentrations from literature	•	•	•	Varies by industry category
Combined pipes		•	•	Varies by plant, in some cases assumptions used in the NCPDI may not capture variability in discharge
Treatment Level	•	•		Complicated for large (POTW)facilities

summarized in Table 5.7. Similar information, organized by NPL site as well as by county and EDA, is included in the appendices.

How Good are the Data?

Evaluating the usefulness of the information presented and judging the reliability of the inferences requires an understanding of the quality of the data used and the biases they contain. Table 5 presents an "overall" rating of the "quality" of the data elements used to estimate point source discharges.

Wastewater Treatment Plants. The data collected for discharge volumes and treatment technology used by a facility are generally good. Better information is available for major rather than minor plants. Pollutant coverage is similar to that of industrial point sources. However, more data are available for petroleum hydrocarbons. The typical pollutant concentrations used when measured data are unavailable were obtained from EPA's Forty-City Study. Most of the plants in this study received some industrial inflows which, along with urban runoff, may be larger sources of toxic materials than domestic sanitary sewage. Based upon a detailed review of indirect discharges to WWTPs contained in the EPA NEEDS Survey, facilities in Maine receive very little industrial inflow. In this case, the estimates are probably an overestimate. In the remaining states, many WWTPs receive significant industrial inflow. Estimates for larger facilities are probably reasonable. For facilities in major urban areas, such as Boston, which receive a large percentage of their inflows from industry, the estimates are probably low.

Industrial Point Source Estimates. The data for large major facilities are generally more accurate than for small (minor) facilities because more and better information is available. The flow data for major facilities is measured flow and should be considered a good estimate of plant wastewater discharge volumes. Flow data for minor facilities come from either measured or design flow data based upon permit levels, or discharge monitoring reports. These data can be considered a good representation of discharge volumes. The pollutant concentration data used comes from permit levels, discharge monitoring reports, or typical concentrations. The monitored data will generally be more accurate than permit or typical concentrations. Many of the pollutants of interest are not regulated on the NPDES permits, and therefore, do not appear in discharge monitoring reports.

Table 5.9 shows the presence/absence of pollutants for major industrial categories, how well it has been studied, and a rating of data variability for the toxic pollutants considered. The ratings by pollutant category are a reflection of the differences in availability of measured data, variability within the industry and how well the industry has been studied. In general, the estimates for petroleum hydrocarbons are less certain than for common or trace metals. Also, the quality of data for metals will be better though the actual discharges may be more variable.

Typically, inorganic chemical and metal working industries contribute various

Table 5.9 Industrial Point Source Data Quality Assessment DRAFT 11/87

Industrial Category	Presence of Pollutant in Discharge: Common Metals	Toxic Metals	Hg	Pet HC	CHP	Well studied	Reliability Rating*: Common Metals	Toxic Metals	Hg	Pet HC	CHP
Adhesives & Sealants	•					No	2 to 3	N/A	N/A	N/A	N/A
Coil Coating	•	•		•		Yes	2 to 3	2 to 4	N/A	2 to 3	N/A
Copper Forming	•	•		•		No	2	2 to 3	N/A	2 to 3	N/A
Electronic Components	•	•	•	•		No	2 to 3	2 to 3	2to3	2 to 3	N/A
Foundry	•	•		•		Yes	2 to 3	2 to 3	N/A	1 to 2	N/A
Inorganic Chemicals	•	•				Yes	2 to 3	2 to 4	2to4	N/A	N/A
Instruments	•	•	•	•		No	2 to 3	2 to 4	2to4	2 to 3	N/A
Iron & Steel	•	•		•		Yes	2 to 3	2 to 4	N/A	1 to 2	N/A
Machinery	•	•	•	•		No	2 to 3	2 to 4	2to4	2	N/A
Metal Finishing/Plating	•	•		•		No	2 to 3	2 to 4	N/A	2 to 3	N/A
Nonferrous Metal Forming	•	•		•		No	2 to 3	2 to 3	N/A	2	N/A
Nonferrous Primary	•	•		•		No	2 to 3	2 to 4	N/A	2	N/A
Organic Chemicals	•	•		•		Yes	2	2 to 4	N/A	2	N/A
Power Transformers	•	•		•		Yes	2 to 3	2 to 3	N/A	2	N/A
Pesticides	•				•	Yes	2 to 3	2 to 3	N/A	N/A	1to2
Printing & Publishing	•	•		•		No	2 to 4	2 to 4	N/A	2 to 3	N/A
Pulp & Paper	•	•	•			Yes	1 to 2	2 to 3	2to3	N/A	N/A
Pharmaceuticals	•	•				No	2 to 3	2 to 3	N/A	N/A	N/A
Rubber Processing	•	•		•		No	2 to 3	2 to 3	N/A	2	N/A
Ship Building	•	•	•	•		No	N/A	2 to 4	2to4	2	N/A
Textile Manufacturing	•	•	•	•		Yes	2 to 3	2	2	N/A	N/A
Timber Products	•	•		•		No	2 to 3	2 to 4	N/A	2	N/A
Transportation Equipment	•	•	•	•		No	2 to 3	2 to 4	2to4	2	N/A

Abbreviations: Hg, mercury; Pet HC, petroleum hydrocarbons; CHP, chlorinated hydrocarbon pesticides; N/A, not applicable.

*Reliability Rating:

(1) Reasonably Certain - excellent data quality, low variability in discharges, known to be within ± 10 - 20% of of actual levels.

(2) Moderately Certain - good data quality, errors introduced due to variability in discharges, errors of up to 20 - 50% are possible.

(3) Reasonable Inference - fair data quality, errors introduced due to variability in discharges and limited sampling data available errors by 50 - 100% are posssible.

(4) Speculative - poor data quality, highly variable discharges and limited or no sampling data available for a given site, errors by a factor in excess of two are possible.

(5) Highly Speculative - unknown data quality; highly variable discharges, poor correlation between factors affecting pollutant loads and actual pollutant discharge levels.

common metals, trace metals, and petroleum hydrocarbons in their discharges. Other industries in the region, such as organic chemical manufacturing, pharmaceutical, pulp and paper, and textile industries, have fewer trace metals in their discharges and smaller levels of petroleum hydrocarbons. Not surprisingly, pesticide manufacturing is the only source of CHP discharges from industrial sources.

Other industries that are well characterized include rubber processing, foundry, and shipbuilding industries. Discharges from organic chemical and pharmaceutical industries, vary significantly from plant to plant. Probably the hardest industries to characterize are industries such as machinery and electronics manufacturing that also vary significantly by plant. Fortunately, because of their small flow volumes, errors will not distort the estuarine system totals significantly.

Steam-Generated Power Plants. Pollutant characteristics vary between power plants, depending upon their cooling systems. Most of the facilities in the region use once-through cooling systems that generally have little net addition of pollutants, except for copper, which is worn off the alloy condenser tubing in small quantities. A few facilities have recycled cooling systems that have small concentrations of other metals and petroleum hydrocarbons. Given the large volumes of cooling water discharged by power plants, even small differences in the concentrations can magnify discharge estimates. In general, the estimates assume the presence of all pollutants typically found in cooling waters. This may cause an overestimate for certain facilities, particularly for facilities that use recycled cooling systems.

Combined Sewer Overflows (CSOs). The accuracy of the estimates for CSO depends upon the accuracy of the estimates of runoff volume, WWTP detention capacity, and typical pollutant concentrations assumed to be carried in the runoff.

The accuracy of estimates for runoff volumes depends upon the quality of the land use data, the precipitation data, and the runoff coefficients used to model CSO loads. The land use data, based on the USGS Land Use and Land Cover (LULC) classification system and the EPA NEEDS Survey estimates of combined sewer acreage served by individual treatment plants, provide reasonably detailed information. The LULC data are representative of the late 1970's and the NEEDS survey estimates are representative of the early 1980's. However, the quality of the NEEDS Survey information, varies by state. The precipitation data used are based upon local weather station data and are generally good. The runoff coefficients are generalized indicators of the presence of paved surfaces, and do not take density differences in specific locations into account. The daily runoff simulation is a generally accurate portrayal of precipitation patterns. The simulation is limited more by the runoff coefficients than the precipitation and runoff modeling.

The information on wastewater treatment plant hydraulic capacity is taken from the NEEDS Survey, and presents a general indication of design capacity. Actual capacity may differ at individual sites. The typical pollutant concentrations are median values

and represent typical conditions. CSO is a highly variable phenomenon and these typical concentrations do not correspond with individual watershed factors, size of storm, and other factors for an individual site. Overall, the runoff coefficients and pollutant concentrations are the weak link in the methodology. Consequently, the estimates represent a crude approximation of average conditions. Actual site, or individual storm loads, are probably not accurately represented. The CSO estimates are less accurate than those for the point sources.

Upstream Sources. The accuracy of the estimates for these sources depends on the quality of the stream flow data and concentration data available at the individual gaging stations. The quality of the flow data used to calculate seasonal flow volumes is generally good. The availability of pollutant concentration data is variable for toxic pollutants. In general, pollutant concentration coverage was better for larger rivers. The use of average pollutant concentrations, where concentrations related to the volume are available, is an oversimplification of the relationship between streamflow and pollutant load. However, a more sophisticated approach to capture the variation in loads associated with changes in streamflow is beyond the scope of existing monitored data for many gaging stations. The upstream source load estimates are also less accurate than those for point source loads. NOAA and the USGS are undertaking a major study to improve the estimates for this category.

What Do the Data Imply?

This subsection is now being developed.

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Coastal Wetlands

Contents

EPA/NOAA Team on Near Coastal Waters

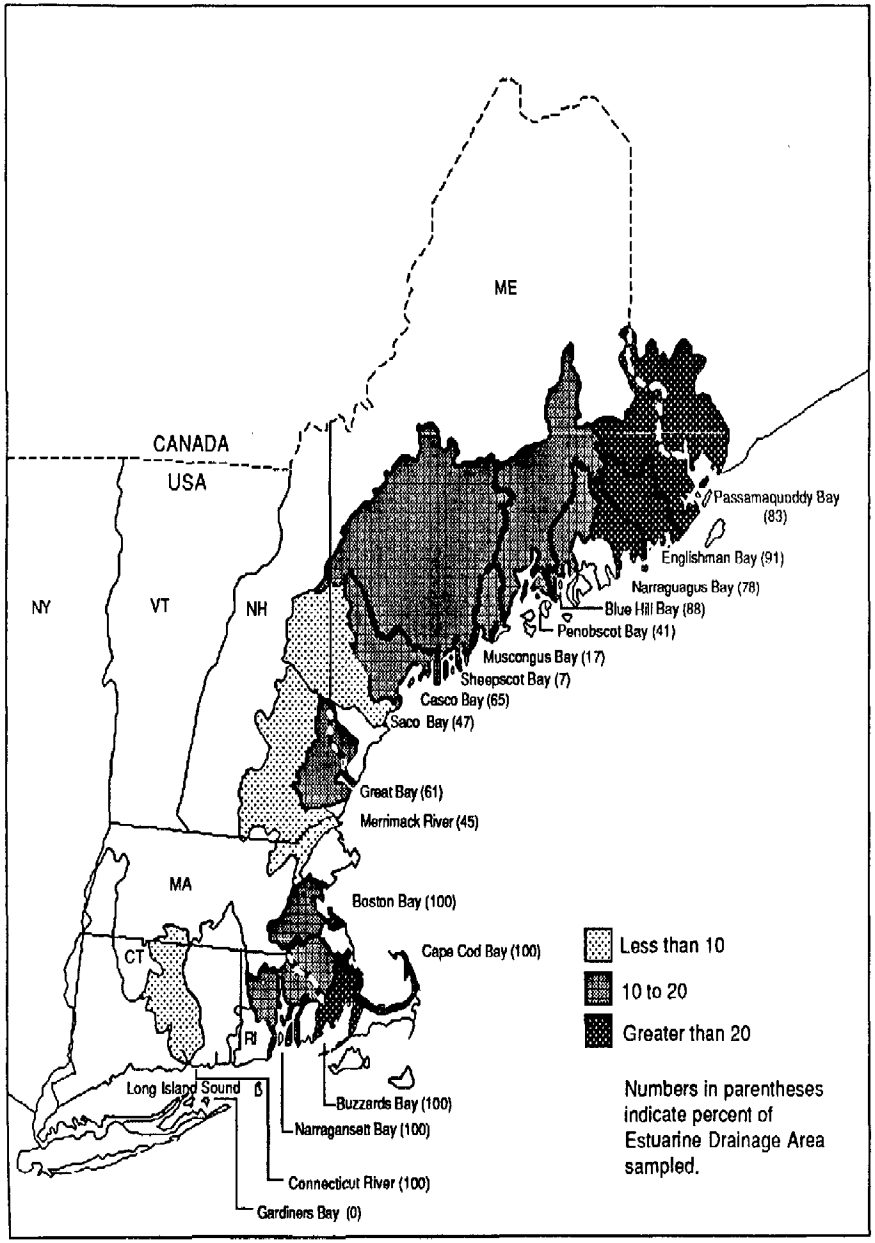


Figure 6.1 Percent of estuarine drainage area lands sampled that are wetlands

Introduction

This section presents estimates of the distribution of twelve types of wetlands for the 16 estuaries in the region (Table 6.1). The data were developed using a systematicgrid sampling procedure on 1:24,000, 1:25,000, and 1:62,500 scale wetland maps produced for the National Wetlands Inventory (NWI) of the U.S. Fish and Wildlife Service. The technique is an alternative to more expensive and time consuming techniques for quantifying NWI map information with a reasonable degree of accuracy and detail.

Despite a growing awareness of the importance of coastal wetlands, a comprehensive data base documenting their current distribution and abundance does not presently exist. Existing coastal wetlands inventories have generally been conducted at state and local levels, but lack a unified system of classification and quantification. Recognizing this gap in wetlands information, NOAA began, in 1985, a grid sampling project to develop the first comprehensive and consistently derived coastal wetlands data base for the coterminous USA (excluding the Great Lakes).

The technique involves the placement of a grid, with approximately 900 uniform cells, over an NWI map and the identification of the wetland type that falls in the center of each grid cell. Grid cells correspond to approximately 45 acres when used with a 1:24,000 scale map. The wetland types designated on NWI maps are aggregated into 15 habitat types - 12 general wetland categories and three additional categories to account for uplands, non-fresh open water, and fresh open water. To cover the coastal areas of the coterminous USA, including the 92 estuaries in NOAA's National Estuarine Inventory, approximately 3,200 NWI maps are available of the 5,000 that are needed.

Grid-sampled data are entered into a mapping and statistics program on a microcomputer. Software has been developed that overlays digitized boundaries on grid-sampled data so that acreage data can be aggregated by state, county, hydrologic unit, and estuary.

The data presented here were generated from grid sampling of all available NWI maps (410) in the Northeast (Maine-Connecticut). Wetlands data by county will be included in the final report. Data for Long Island Sound are not included, but will be presented in a report on wetlands of the mid-Atlantic states (New York - Virginia).

Table 6.1 Wetlands by Estuarine Drainage Area (x100 acres)

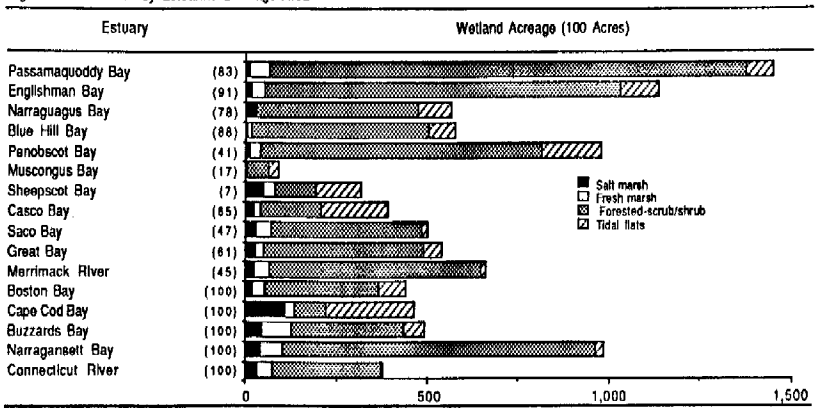
Draft 11/87

Estuary(1)	Fresh Marsh				Salt Marsh					Forested Scrub/Shrub					Tidal Flats	Total Wetlands
	Tidal	Non-Tidal	Unsp.	**Total**	High	Low	Brackish	Unsp.	**Total**	Estuarine	Tidal Fr.	Non-Tidal	Unsp.	**Total**		
Passamaquoddy Bay	0	0	48	**48**	0	0	0	10	**10**	<1	0	<1	1309	**1,310**	**80**	**1,448**
Englishman Bay	0	<1	36	**36**	0	0	0	15	**15**	0	0	27	954	**981**	**104**	**1,136**
Narraguagus Bay	0	4	<1	**4**	0	0	0	23	**23**	0	0	239	212	**451**	**93**	**571**
Blue Hill Bay	0	13	3	**16**	0	0	0	2	**2**	0	0	422	64	**486**	**73**	**576**
Penobscot Bay	0	21	7	**28**	0	0	0	10	**10**	0	0	659	116	**775**	**166**	**979**
Muscongus Bay	0	0	1	**1**	0	0	0	2	**2**	0	0	2	56	**58**	**29**	**91**
Sheepscot Bay	18	5	5	**28**	0	0	0	50	**50**	0	10	41	66	**117**	**119**	**314**
Casco Bay	0	14	<1	**14**	0	0	<1	23	**23**	<1	0	166	<1	**167**	**186**	**389**
Saco Bay	0	39	1	**41**	0	0	0	29	**29**	0	0	398	15	**413**	**18**	**500**
Great Bay	0	1	18	**19**	0	0	0	27	**27**	0	0	4	392	**396**	**67**	**509**
Merrimack River	0	1	47	**48**	0	0	0	23	**23**	0	0	9	526	**534**	**11**	**616**
Boston Bay	0	2	35	**37**	0	0	0	18	**18**	0	0	63	242	**306**	**79**	**441**
Cape Cod Bay	0	7	18	**24**	0	0	0	106	**106**	0	3	35	53	**91**	**241**	**463**
Buzzards Bay	0	<1	81	**80**	0	0	0	41	**41**	<1	0	13	298	**311**	**48**	**480**
Narragansett Bay	0	2	60	**62**	0	0	0	38	**38**	0	0	151	713	**864**	**24**	**987**
Connecticut River	12	27	4	**43**	0	0	24	7	**31**	0	3	228	58	**289**	**4**	**366**
REGIONAL TOTALS	30	136	364	**530**	0	0	24	422	**446**	1	16	2457	5075	**7549**	**1341**	**9866**

Abbreviations: Unsp., Unspecified; Tidal Fr., Tidal Fresh

(1) Data for Gardiners Bay and Long Island Sound are not available; Connecticut River is a subestuary of Long Island Sound.

Figure 6.2 Wetlands by Estuarine Drainage Area



Numbers in parentheses indicate percent of EDA sampled.

Public Outdoor Recreation Facilities

Contents

EPA/NOAA Team on Near Coastal Waters

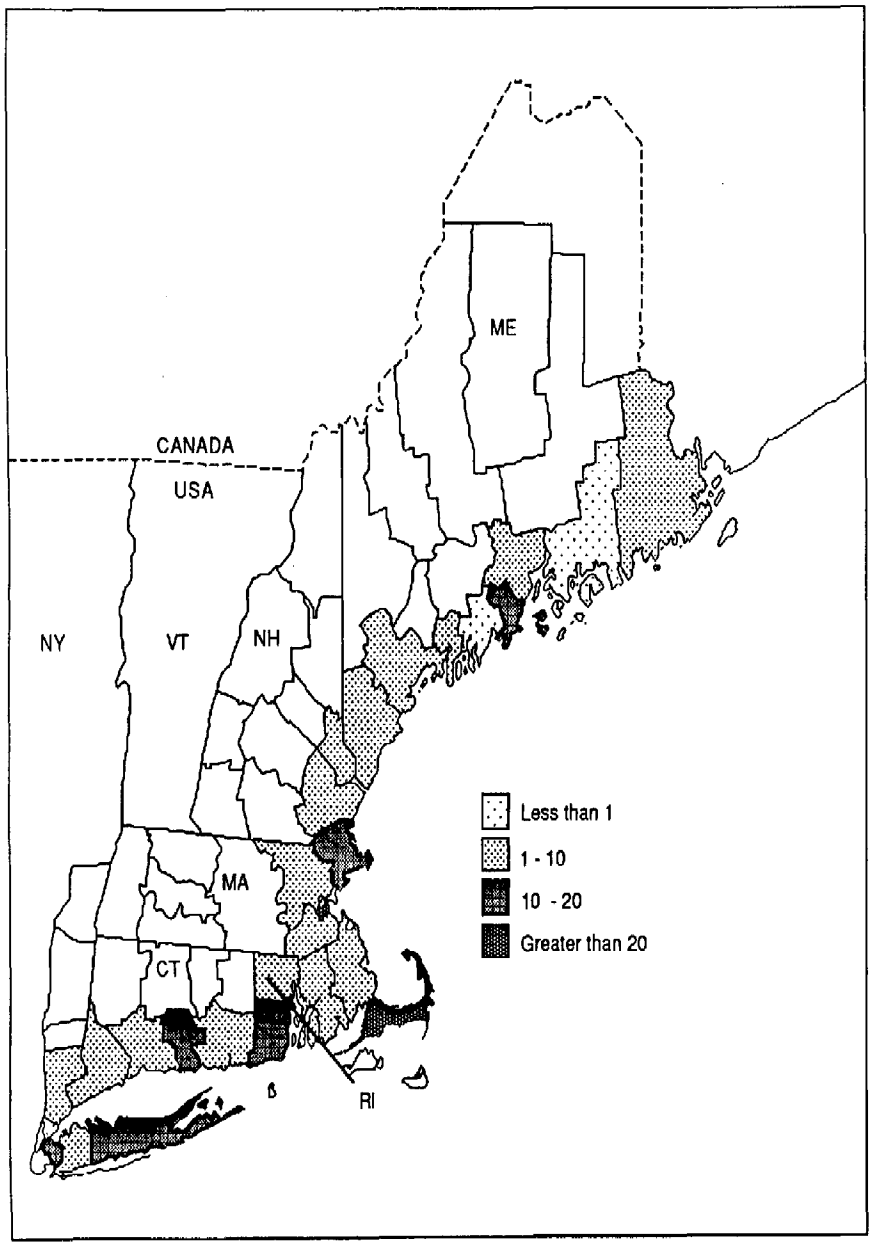


Figure 7.1 Percent of county land dedicated to public outdoor recreational areas.

Introduction

This section presents information on the public recreation facilities supplied by governmental agencies in the coastal counties within the Estuarine Drainage Areas (EDAs) of the region. The data are taken from the 1984 NOAA Inventory of Public Outdoor Recreation Facilities in Coastal Areas of the USA. Data in the NOAA inventory are organized by coastal county. In this volume the data are aggregated by three groups of EDAs (Table 7.1) to minimize the amount of double counting that would result if recreation areas and facilities were estimated for individual EDAs and fell within two or more EDAs. The estuarine groups are Passamaquoddy Bay through Great Bay; Merrimack River through Narragansett Bay and Gardiners Bay through Long Island Sound. Appendix 7 presents information for each coastal county. Data were generated from a questionnaire survey of all public agencies that own or manage recreation land in coastal areas of the continuous USA.

Society places a high recreational value on the services provided by estuaries. Investment in public recreation facilities within estuaries, such as boat ramps and wildlife sanctuaries, are a reflection of the social value of the recreation experiences they help produce. In 1982 alone, over $4.5 billion were spent by public agencies to provide outdoor recreation in the 328 coastal counties of the coterminous USA. An unknown proportion of this was spent on facilities located in estuaries.

Table 7.1 provides a summary, by level of government, of the public outdoor recreation facilities located in the three estuarine groups for 1984.

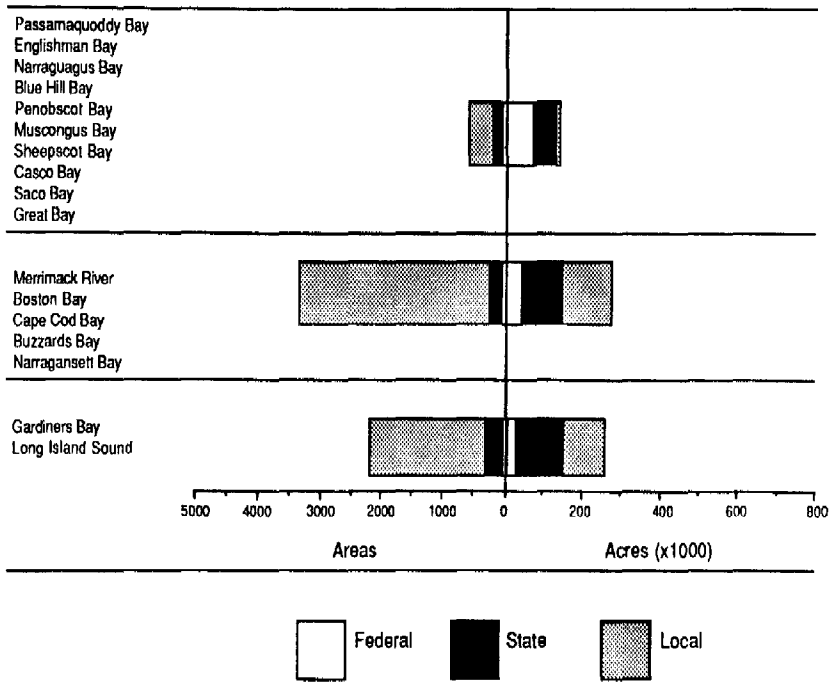
More detailed information on the results of the survey and the methods used for converting survey results by county to EDA will be included in the final report.

Table 7.1 Public Outdoor Recreational Facilities by Estuary Groups (1984)

DRAFT 11/87

Estuary Group		Number of Areas			Acres (x1000)			Facilities						
		Total	Adjacent to Tidal Waters	Adjacent to Ocean Waters	Total Land and Water	Hunting	Conservation	Ramps	Slips	Docks	Fishing Piers	Artificial Reefs	Beach (miles)	Campsites (RV & tent)
Passamaquoddy Bay	Local	388	53	19	12.3	2.6	3.5	58	86	26	18	0	33	186
Englishman Bay	State	169	115	84	57.4	28.6	4.7	40	0	11	7	0	132	811
Narraguagus Bay	Federal	12	10	5	70.4	24.2	46.0	2	0	0	0	0	<1	524
Blue Hill Bay	**Total**	**569**	**178**	**108**	**140.2**	**55.4**	**54.2**	**100**	**86**	**37**	**25**	**0**	**165**	**1,521**
Penobscot Bay														
Muscongus Bay														
Sheepscot Bay														
Casco Bay														
Saco Bay														
Great Bay														
Merrimack River	Local	3,108	280	121	127.9	12.0	36.2	383	3,537	151	66	1	254	1,523
Boston Bay	State	216	67	30	105.2	74.6	1.2	96	160	22	9	0	20	3,242
Cape Cod Bay	Federal	19	11	6	39.4	14.7	18.7	8	12	10	5	0	43	0
Buzzards Bay	**Total**	**3,343**	**358**	**157**	**272.5**	**101.3**	**56.1**	**487**	**3,709**	**183**	**80**	**1**	**317**	**4,765**
Narragansett Bay														
Gardiners Bay	Local	1,884	318	142	85.8	12.9	35.9	159	7,837	92	75	8	102	1,540
Long Island Sound	State	315	120	28	126.5	69.3	8.4	112	0	217	8	0	12	1,225
	Federal	11	9	5	19.6	6.3	12.8	2	216	8	0	0	22	26
	Total	**2,210**	**447**	**167**	**231.9**	**88.5**	**57.1**	**273**	**8,053**	**317**	**83**	**8**	**136**	**2,791**
REGIONAL TOTALS	Local	5,380	651	282	226.0	27.5	75.6	600	11,460	269	159	9	389	3,249
	State	700	302	142	289.1	172.5	14.3	248	160	250	24	0	164	5,278
	Federal	42	30	16	129.4	45.2	77.5	12	228	18	5	0	65	550
TOTAL - ALL AGENCIES		**6,122**	**938**	**440**	**644.5**	**245.2**	**167.4**	**863**	**11,788**	**537**	**188**	**9**	**618**	**9,077**

Figure 7.2 Public Outdoor Recreation by Estuary Group



Appendices

Contents

* Not in Interim Draft

EPA/NOAA Team on Near Coastal Waters

Appendix 2

Table 1. Land Use by Counties within Estuarine Drainage Areas — DRAFT 11/87

Estuary/County		Residential	Commercial Services	Industrial	Transportation	Other Urban	Total Urban	Cropland/ Pasture	Other Agriculture	Total Agriculture	Total Range	Deciduous Forest	Evergreen Forest	Mixed Forest	Total Forest	Total Other (a)	Total Land	Percent of County Land
PASSAMAQUODDY BAY (b)																		
Aroostook, ME	(E)	0	0	0	0	0	0	1	0	1	0	19	31	13	63	7	72	1
	(O)	37	12	3	9	1	62	760	<1	760	0	1219	2987	1041	5247	512	6582	99
	(T)	37	12	3	9	1	62	761	<1	761	0	1,239	3,018	1054	5311	519	6,655	100
Hancock, ME	(E)	0	0	0	0	0	0	0	0	0	0	2	10	<1	12	3	16	1
	(O)	65	3	<1	<1	8	77	20	<1	20	71	203	366	726	1295	113	1577	99
	(T)	65	3	<1	<1	8	77	20	<1	20	71	205	377	726	1308	117	1593	100
Penobscot, ME	(E)	0	0	0	0	0	0	1	0	1	0	19	31	13	63	7	72	2
	(O)	45	8	3	16	7	79	190	<1	190	16	598	1122	820	2540	507	3333	98
	(T)	45	8	3	16	7	79	192	<1	192	16	617	1153	833	2603	516	3406	100
Washington, ME	(E)	7	<1	<1	<1	1	9	51	<1	51	4	174	689	150	1013	114	1192	46
	(O)	9	1	<1	4	0	14	74	<1	74	30	138	716	248	1102	166	1388	54
	(T)	16	2	<1	5	1	24	125	<1	125	34	312	1405	399	2116	283	2580	100
System Totals	(E)	7	<1	<1	<1	1	9	53	<1	53	4	214	760	178	1152	133	1352	9
	(O)	161	25	7	31	19	243	1248	7	1255	119	2159	5323	2864	10346	1406	13369	91
	(T)	168	26	8	31	20	253	1301	7	1308	123	2373	6083	3042	11498	1540	14721	100
ENGLISHMAN BAY																		
Hancock, ME	(E)	5	<1	0	0	1	6	1	0	1	4	9	20	30	59	5	74	5
	(O)	60	3	<1	<1	7	71	19	<1	19	68	196	357	697	1250	111	1519	95
	(T)	65	3	<1	<1	8	77	20	<1	20	71	205	377	726	1308	117	1593	100
Washington, ME	(E)	3	<1	0	4	0	7	33	0	33	10	56	430	116	602	72	725	28
	(O)	13	1	<1	1	1	16	92	<1	92	23	255	975	282	1512	211	1854	72
	(T)	16	2	<1	5	1	24	125	<1	125	34	312	1405	399	2116	283	2580	100
System Totals	(E)	8	<1	0	4	1	13	34	0	34	14	66	449	146	661	76	799	19
	(O)	73	4	1	2	7	87	110	<1	110	91	451	1332	979	2762	322	3373	81
	(T)	81	4	1	5	9	100	144	<1	144	105	517	1782	1125	3424	397	4172	100
NARRAGUAGUS BAY																		
Hancock, ME	(E)	<1	0	0	0	0	0	0	0	0		32	22	48	102	7	110	7
	(O)	64	3	<1	<1	8	76	20	<1	20	70	174	354	679	1207	107	1483	93
	(T)	65	3	<1	<1	8	77	20	<1	20	71	205	377	726	1308	116	1593	100
Washington, ME	(E)	3	<1	0	0	0	3	24	0	24	13	20	97	66	183	45	262	10
	(O)	13	1	<1	5	1	20	101	<1	101	21	292	1308	332	1932	245	2317	90
	(T)	16	2	<1	5	1	24	125	<1	125	34	312	1405	399	2116	283	2580	100
System Totals	(E)	3	<1	0	0	0	3	24	0	24	14	52	120	114	286	61	389	9
	(O)	77	4	1	5	9	96	121	<1	121	91	465	1662	1011	3138	346	3800	91
	(T)	81	4	1	5	9	100	144	<1	144	105	517	1782	1125	3424	398	4172	100

Abbreviations: E, estuarine drainage area; O, area outside the estuarine drainage area; T, totals.
Note: All values are rounded.
(a) Includes barren lands and wetlands. (b) Land use data are unavailable by county for Canadian portion of Passamaquoddy Bay.

Appendix 2

Table 1. Land Use by Counties within Estuarine Drainage Areas

Estuary/County		Residential	Commercial Services	Industrial	Transportation	Other Urban	Total Urban	Cropland/ Pasture	Other Agriculture	Total Agriculture	Total Range	Deciduous Forest	Evergreen Forest	Mixed Forest	Total Forest	Total Other (a)	Total Land	Percent of County Land
BLUE HILL BAY																		
Hancock, ME	(E)	21	1	<1	<1	2	25	8	<1	8	28	70	138	272	478	47	588	37
	(O)	44	2	<1	<1	5	52	11	<1	11	43	135	241	454	830	67	1005	63
	(T)	65	3	<1	<1	8	77	20	<1	20	71	205	377	726	1308	116	1593	100
Penobscot, ME	(E)	<1	0	0	0	0	0	0	0	0	0	6	11	3	20	47	21	1
	(O)	45	8	3	16	7	79	192	<1	192	16	611	1142	831	2584	514	3385	99
	(T)	45	8	3	16	7	79	192	<1	192	16	617	1153	833	2603	516	3406	100
System Totals	(E)	21	1	<1	<1	2	25	8	<1	8	28	77	147	275	499	48	608	12
	(O)	88	10	3	17	12	130	203	1	204	60	746	1383	1285	3414	581	4390	88
	(T)	109	11	4	17	14	155	211	1	212	87	822	1530	1560	3912	631	4998	100
PENOBSCOT BAY																		
Aroostook, ME	(E)	<1	0	0	0	0	0	2	0	2	0	12	17	6	35	3	41	1
	(O)	37	12	3	9	1	62	759	<1	759	0	1227	3001	1048	5276	515	6614	99
	(T)	37	12	3	9	1	62	761	<1	761	0	1239	3018	1054	5311	519	6655	100
Hancock, ME	(E)	25	<1	<1	<1	1	27	8	<1	8	29	62	124	220	406	35	507	32
	(O)	39	2	<1	<1	6	48	11	<1	11	42	143	253	507	903	81	1086	68
	(T)	65	3	<1	<1	8	77	20	<1	20	71	205	377	726	1308	114	1593	100
Knox, ME	(E)	7	<1	<1	<1	1	9	5	<1	5	2	5	5	30	40	1	57	14
	(O)	13	<1	0	<1	1	14	31	<1	31	9	23	39	184	246	40	343	86
	(T)	20	1	<1	1	2	23	36	<1	36	11	28	44	214	286	40	400	100
Penobscot, ME	(E)	37	7	2	14	5	65	120	<1	120	15	199	524	506	1229	295	1727	51
	(O)	7	<1	1	3	1	12	71	<1	71	1	418	628	328	1374	218	1679	49
	(T)	45	8	3	16	7	79	192	<1	192	16	617	1153	833	2603	516	3406	100
Piscataquis, ME	(E)	<1	0	0	0	0	0	1	0	1	0	3	13	9	25	11	37	1
	(O)	6	2	1	<1	0	9	60	<1	60	0	769	2240	587	3596	275	3943	99
	(T)	6	2	1	<1	0	9	62	<1	62	0	772	2253	596	3621	287	3981	100
Waldo, ME	(E)	12	<1	<1	1	1	15	32	<1	32	7	29	49	257	335	9	400	55
	(O)	2	<1	<1	<1	1	4	38	<1	38	2	20	52	192	264	20	328	45
	(T)	14	<1	<1	1	2	18	70	1	71	8	49	101	449	599	29	728	100
System Totals	(E)	82	10	3	15	11	121	169	2	171	52	310	733	1027	2070	354	2769	17
	(O)	105	18	6	14	10	153	971	2	973	55	2601	6212	2845	11658	1153	13993	83
	(T)	187	28	9	29	20	273	1140	4	1144	107	2910	6945	3872	13727	1509	16781	100

Abbreviations: E, esturaine drainage area; O, area outside the estuarine drainage area; T, totals.
Note: All values are rounded.
(a) Includes barren lands and wetlands.

Appendix 2

Table 1. Land Use Counties within Estuarine Drainage Areas

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Estuary/County		Residential	Commercial Services	Industrial	Transportation	Other Urban	Total Urban	Cropland/ Pasture	Other Agriculture	Total Agriculture	Total Range	Deciduous Forest	Evergreen Forest	Mixed Forest	Total Forest	Total Other (a)	Total Land	Percent of County Land
MUSCONGUS BAY																		
Knox, ME	(E)	9	<1	0	0	1	10	22	<1	22	6	23	16	113	152	39	228	57
	(O)	11	1	<1	1	1	14	14	<1	14	5	5	28	102	135	1	173	43
	(T)	20	1	<1	1	2	24	36	<1	36	11	28	44	214	286	40	400	100
Lincoln, ME	(E)	4	<1	0	0	0	4	6	<1	6	1	1	3	65	69	2	82	18
	(O)	12	1	<1	0	3	16	33	<1	83	2	7	40	274	321	9	382	82
	(T)	15	1	<1	0	3	19	40	<1	40	2	8	43	339	390	10	464	100
Waldo, ME																		
	(E)	<1	0	<1	0	0	1	7	<1	7	0	10	15	57	82	4	94	13
	(O)	13	<1	<1	1	1	16	64	1	64	8	39	87	392	518	26	634	87
	(T)	14	<1	<1	1	2	18	71	1	11	8	49	101	449	599	29	728	100
System Totals	(E)	14	<1	<1	0	1	16	35	<1	35	6	34	33	235	302	44	404	25
	(O)	36	3	<1	3	8	50	111	1	112	15	51	155	768	974	37	1186	75
	(T)	50	4	<1	3	8	65	146	1	147	22	85	188	1002	1275	82	1592	100
SHEEPSCOT BAY																		
Androscoggin, ME	(E)	20	2	<1	3	3	28	82	2	84	0	33	48	236	317	13	444	94
	(O)	<1	0	0	<1	0	1	5	0	5	0	0	11	10	21	0	27	6
	(T)	21	2	<1	3	3	29	87	2	87	0	33	58	246	337	14	471	100
Cumberland, ME	(E)	4	4	0	2	2	12	10	<1	10	0	5	18	30	53	1	78	9
	(O)	84	15	3	11	10	123	83	2	85	1	29	290	254	573	24	806	91
	(T)	88	19	3	14	12	136	93	2	95	1	35	308	284	627	27	884	100
Franklin, ME	(E)	7	1	<1	<1	2	11	44	<1	44	0	158	289	391	838	25	908	53
	(O)	3	<1	0	<1	1	5	6	0	6	0	93	551	105	749	32	790	47
	(T)	10	10	<1	<1	3	15	50	<1	50	0	251	839	496	1586	45	1698	100
Kennebec, ME	(E)	30	5	<1	8	5	46	129	1	130	2	38	66	558	662	28	870	100
	(O)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(T)	30	5	<1	8	5	48	129	1	130	2	38	66	558	662	28	870	100
Knox, ME	(E)	<1	0	0	0	1	1	4	0	4	3	12	1	23	36	0	45	11
	(O)	19	1	<1	1	2	23	32	<1	32	8	16	42	192	250	39	355	89
	(T)	20	1	<1	1	2	23	36	<1	36	11	28	44	214	286	40	400	100
Lincoln, ME	(E)	11	1	<1	0	3	15	32	<1	32	2	6	39	260	305	9	363	78
	(O)	4	<1	0	0	0	4	8	<1	8	0	2	5	80	87	2	101	22
	(T)	15	1	<1	0	3	19	40	<1	40	2	8	43	339	390	10	464	100
Oxford, ME	(E)	9	2	1	<1	2	14	45	<1	45	0	234	336	408	978	15	1052	51
	(O)	5	<1	<1	<1	2	8	21	<1	21	0	242	454	245	941	29	999	49
	(T)	14	2	1	<1	4	21	65	<1	65	0	476	790	653	1919	41	2051	100

Abbreviations: E, estuarine drainage area; O, area outside the estuarine drainage area; T, totals.
Note: All values are rounded.
(a) Includes barren lands and wetlands.

Appendix 2

Table 1 Land Use by Counties within Estuarine Drainage Areas

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Estuary/County		Residential	Commercial Services	Industrial	Transportation	Other Urban	Total Urban	Cropland/ Pasture	Other Agriculture	Total Agriculture	Total Range	Deciduous Forest	Evergreen Forest	Mixed Forest	Total Forest	Total Other (a)	Total Land	Percent of County Land
Penobscot, ME	(E)	3	<1	<1	1	1	5	35	<1	35	1	11	36	93	140	11	194	6
	(O)	41	8	3	15	5	72	156	<1	156	15	606	1117	741	2464	504	3212	94
	(T)	45	8	3	16	7	79	192	<1	192	16	617	1153	833	2603	516	3406	100
Piscataquis, ME	(E)	<1	0	0	0	0	0	8	0	8	0	6	40	16	62	4	75	2
	(O)	6	2	1	<1	0	9	54	<1	54	0	766	2213	579	3558	282	3905	98
	(T)	6	2	1	<1	0	9	62	<1	62	0	772	2253	596	3621	287	3981	100
Sagadahoc, ME	(E)	3	<1	<1	<1	1	5	30	<1	30	0	8	17	133	158	8	200	78
	(O)	4	<1	0	0	0	4	3	0	3	0	1	5	38	44	4	56	22
	(T)	7	<1	<1	<1	1	9	33	<1	33	0	9	22	171	202	13	257	100
Somerset, ME	(E)	12	2	2	3	1	20	119	<1	119	1	189	311	616	1116	42	1301	33
	(O)	1	<1	<1	<1	0	2	3	3	3	0	512	1584	407	2503	141	2650	67
	(T)	13	2	2	3	2	22	122	<1	122	1	701	1895	1023	3619	185	3951	100
Waldo, ME	(E)	1	<1	<1	<1	1	3	31	<1	31	2	10	37	134	181	16	233	32
	(O)	13	<1	<1	1	1	16	39	<1	99	7	39	64	314	417	12	495	68
	(T)	14	<1	<1	1	2	18	70	1	70	8	49	101	449	599	29	728	100
Carroll, NH	(E)	0	0	0	0	0	0	0	0	0	0	<1	<1	0	1	0	<1	0
	(O)	29	2	<1	<1	4	36	25	<1	25	0	206	226	419	851	24	938	100
	(T)	29	2	<1	<1	4	36	25	<1	25	0	207	226	419	852	24	938	100
Coos, NH	(E)	0	0	0	0	0	0	<1	0	0	0	44	29	1	74	1	75	4
	(O)	8	1	<1	1	2	12	70	0	70	0	575	742	270	1587	41	1722	96
	(T)	8	1	<1	1	2	12	71	0	71	0	619	771	271	1661	41	1798	100
System Totals	(E)	102	18	6	18	20	164	569	5	514	11	755	1265	2899	4919	169	5836	27
	(O)	219	32	9	32	31	323	506	4	510	33	3088	7304	3853	14045	1135	16058	73
	(T)	321	50	15	50	50	486	1074	10	1074	44	3844	8570	6552	18966	1304	21895	100
CASCO BAY																		
Androscoggin, ME	(E)	<1	0	0	<1	0	1	5	0	5	0	0	11	10	21	0	27	6
	(O)	20	2	<1	3	3	28	82	2	84	0	33	48	236	317	13	444	94
	(T)	21	2	<1	3	3	29	87	2	89	0	33	58	246	337	14	471	100
Cumberland, ME	(E)	89	16	3	12	10	274	63	2	65	1	12	255	229	496	20	732	83
	(O)	0	2	0	2	2	6	10	0	10	0	23	53	55	131	7	152	17
	(T)	88	19	3	14	12	136	93	2	95	1	35	308	284	627	27	884	100
Oxford, ME	(E)	<1	<1	<1	<1	1	2	4	<1	4	0	31	48	42	121	2	128	6
	(O)	13	3	1	<1	4	20	62	<1	62	0	445	742	611	1798	40	1923	94
	(T)	14	2	1	<1	4	21	65	<1	65	0	476	790	653	1129	43	2051	100
Sagadahoc, ME	(E)	4	<1	0	0	0	4	3	0	3	0	1	5	38	44	4	56	22
	(O)	3	<1	<1	<1	1	5	30	<1	30	0	8	17	133	58	8	200	78
	(T)	7	<1	<1	<1	1	9	33	<1	33	0	9	22	171	202	13	257	100

Abbreviations: E, estuarine drainage area; O, outside the estua

Note: All values are rounded.

(a) Includes barren lands and wetlands.

Appendix 2

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Table 1. Land Use by Counties within Estuarine Drainage Areas

Estuary/County		Residential	Commercial	Industrial/ Services	Transportation	Other	Total Urban	Cropland/ Urban	Other Pasture	Total Agriculture	Total Agriculture	Deciduous Range	Evergreen Forest	Mixed Forest	Total Forest	Total Forest	Total Other (a)	Land
York, ME	(E)	2	<1	0	0	0	2	5	0	5		6	16	7	29	0	36	4
	(O)	77	10	<1	8	8	103	72	3	75	2	49	301	402	752	41	973	96
	(T)	79	10	<1	8	8	105	77	3	80	2	54	317	410	781	42	1009	100
System Totals	(E)	96	17	3	13	11	140	100	2	102	1	49	335	326	710	26	979	21
	(O)	113	16	3	13	17	162	256	5	261	2	558	1160	1437	3155	113	3692	79
	(T)	209	33	6	25	27	500	356	7	363	3	607	1495	1763	3865	139	4672	100
SACO BAY																		
Cumberland, ME	(E)	9	1	<1	1	1	12	8	<1	8	0	5	43	52	100	6	128	15
	(O)	79	17	2	12	11	121	84	2	86	1	30	264	233	527	21	756	85
	(T)	88	19	3	14	12	136	93	2	95	1	35	308	284	627	27	884	100
Oxford, ME	(E)	5	<1	<1	<1	2	8	16	<1	16	0	77	105	114	296	15	335	16
	(O)	9	2	1	<1	2	14	49	<1	49	0	399	685	539	1623	27	1717	84
	(T)	14	2	1	<1	4	21	65	<1	65	0	476	790	653	1919	44	2051	100
York, ME	(E)	25	3	<1	2	2	32	29	1	30	0	22	115	191	328	18	410	41
	(O)	54	7	<1	6	4	71	48	1	49	1	32	202	218	452	23	599	59
	(T)	79	10	<1	8	8	105	77	3	80	2	54	317	410	781	42	1009	100
Carroll, NH	(E)	15	2	<1	<1	3	21	19	<1	19	0	181	190	293	664	19	722	77
	(O)	14	<1	0	<1	1	16	6	<1	6	0	25	36	126	187	4	216	23
	(T)	29	2	<1	<1	4	36	25	<1	25	0	207	226	419	852	24	938	100
Coos, NH	(E)	0	<1	0	0	0	0	0	0	0	0	9	41	1	51	0	56	3
	(O)	8	1	<1	1	2	12	71	0	71	0	610	730	270	1610	41	1742	97
	(T)	8	1	<1	1	2	12	71	0	71	0	619	771	271	1661	41	1798	100
Grafton, NH	(E)	0	0	0	0	0	0	0	0	0	0	21	23	29	73	0	73	4
	(O)	22	3	<1	7	10	42	101	<1	101	0	349	407	744	1500	5	1550	96
	(T)	22	3	<1	7	10	42	101	<1	101	0	370	430	773	1573	6	1722	100
System Totals	(E)	54	7	1	4	9	75	73	2	75	0	316	517	679	1512	62	1723	21
	(O)	186	31	5	27	30	279	360	4	364	3	1445	2325	2130	5900	127	6679	79
	(T)	240	38	7	30	39	354	433	6	439	4	1761	2842	2809	7412	183	8402	100
GREAT BAY																		
York, ME	(E)	11	0	0	0	0	11	11	0	11	<1	<1	55	63	118	2	142	14
	(O)	68	10	<1	8	8	94	67	3	70	2	54	262	346	662	39	867	86
	(T)	79	10	<1	8	8	105	77	3	80	2	54	317	410	781	42	1009	100
Carroll, NH	(E)	3	<1	0	0	0	3	2	0	2	0	3	10	25	38	0	44	5
	(O)	27	2	<1	<1	4	34	23	<1	23	0	204	216	394	814	23	895	95
	(T)	29	2	<1	<1	4	36	25	<1	25	0	207	226	419	852	24	938	100

Abbreviations: E, estuarine drainage area; O, area outside the estuarine drainage area; T, totals.
Note: All values are rounded.
(a) Includes barren lands and wetlands.

Appendix 2

Table 1. Land Use by Counties within Estuarine Drainage Areas

DRAFT 11/87

Estuary/County		Residential	Commercial Services	Industrial	Transportation	Other Urban	**Total Urban**	Cropland/ Pasture	Other Agriculture	**Total Agriculture**	**Total Range**	Deciduous Forest	Evergreen Forest	Mixed Forest	**Total Forest**	**Total Other (a)**	**Total Land**	Percent of County Land
Rockingham, NH	(E)	24	8	1	2	5	**37**	41	1	**42**	**0**	3	44	219	**266**	**16**	**364**	52
	(O)	35	7	<1	3	3	**48**	21	2	**23**	**0**	65	45	137	**247**	**15**	**333**	48
	(T)	59	14	1	5	8	**87**	62	3	**65**	**0**	68	89	357	**514**	**30**	**697**	100
Strafford, NH	(E)	26	5	<1	3	2	**35**	37	<1	**37**	**0**	6	92	149	**247**	**8**	**330**	90
	(O)	1	<1	0	0	1	**2**	<1	<1	**1**	**0**	3	10	22	**35**	**1**	**38**	10
	(T)	27	5	<1	3	2	**37**	38	1	**38**	**0**	9	102	171	**282**	**9**	**368**	100
System Totals	(E)	63	13	2	5	8	**91**	91	2	**93**	**0**	11	201	457	**669**	**27**	**880**	29
	(O)	131	19	1	11	15	**168**	111	5	**116**	**2**	327	533	899	**1759**	**76**	**2133**	71
	(T)	194	32	3	16	22	**267**	202	7	**209**	**2**	338	734	1356	**2428**	**105**	**3013**	100
MERRIMACK RIVER																		
Essex, MA	(E)	35	9	2	4	7	**57**	21	<1	**21**	**0**	53	3	11	**67**	**11**	**155**	31
	(O)	62	11	2	3	8	**86**	22	<1	**22**	**0**	182	2	10	**194**	**37**	**343**	69
	(T)	98	20	3	7	14	**142**	43	<1	**43**	**0**	235	5	21	**261**	**48**	**498**	100
Middlesex, MA	(E)	40	10	<1	2	4	**56**	12	<1	**12**	**0**	45	19	39	**103**	**6**	**176**	21
	(O)	181	37	4	8	23	**253**	36	2	**38**	**0**	255	38	51	**342**	**13**	**647**	79
	(T)	221	47	4	10	27	**309**	48	3	**51**	**0**	300	55	90	**445**	**17**	**823**	100
Worcester, MA	(E)	<1	<1	0	<1	0	**1**	<1	0	**0**	**0**	3	<1	5	**8**	**0**	**9**	1
	(O)	119	30	5	12	21	**187**	130	6	**136**	**0**	844	130	140	**1114**	**76**	**1514**	99
	(T)	119	30	5	12	20	**186**	130	6	**136**	**0**	847	130	145	**1122**	**76**	**1523**	100
Belknap, NH	(E)	21	4	<1	<1	4	**30**	22	<1	**22**	**0**	17	50	199	**266**	**7**	**325**	80
	(O)	1	<1	0	2	0	**3**	4	<1	**4**	**0**	5	8	60	**71**	**0**	**80**	20
	(T)	23	4	<1	3	3	**33**	26	<1	**26**	**0**	22	55	260	**337**	**7**	**405**	100
Carroll, NH	(E)	12	<1	0	<1	1	**14**	4	<1	**4**	**0**	13	25	83	**121**	**4**	**143**	15
	(O)	18	2	<1	<1	3	**24**	21	<1	**21**	**0**	194	201	336	**552**	**20**	**796**	85
	(T)	29	2	<1	<1	5	**37**	25	<1	**25**	**0**	207	226	419	**852**	**24**	**938**	100
Grafton, NH	(E)	0	0	0	0	0	**0**	<1	0	**0**	**0**	<1	0	1	**1**	**0**	**2**	0
	(O)	22	3	<1	7	10	**42**	101	<1	**101**	**0**	369	430	772	**1571**	**6**	**1721**	100
	(T)	22	3	<1	7	10	**42**	101	<1	**101**	**0**	370	430	773	**1573**	**6**	**1722**	100
Hillsborough, NH	(E)	43	10	1	3	7	**64**	38	2	**41**	**0**	54	81	319	**454**	**9**	**569**	65
	(O)	10	2	<1	<1	2	**15**	13	1	**14**	**0**	19	61	195	**275**	**3**	**308**	35
	(T)	53	12	2	4	9	**80**	51	4	**55**	**0**	74	142	513	**729**	**13**	**877**	100
Merrimack, NH	(E)	19	3	<1	6	2	**30**	39	<1	**39**	**0**	29	48	314	**391**	**8**	**469**	50
	(O)	9	<1	<1	4	4	**18**	16	<1	**16**	**0**	35	89	297	**421**	**10**	**467**	50
	(T)	28	4	1	10	6	**49**	56	1	**57**	**0**	64	137	611	**812**	**17**	**936**	100
Rockingham, NH	(E)	28	6	<1	2	2	**38**	20	1	**21**	**0**	65	38	122	**225**	**4**	**290**	42
	(O)	32	9	1	3	5	**50**	42	2	**44**	**0**	3	51	235	**289**	**25**	**407**	58
	(T)	59	14	1	5	8	**87**	62	3	**65**	**0**	68	89	357	**514**	**30**	**697**	100

Abbreviations: E, estuarine drainage area; O, area outside the estuarine drainage area; T, totals.
Note: All values are rounded.
(a) Includes barren lands and wetlands.

Appendix 2

Table 1. Land Use by Counties within Estuarine Drainage Areas

DRAFT 11/87

Estuary/County		Residential	Commercial Services	Industrial	Transportation	Other Urban	Total Urban	Cropland/ Pasture	Other Agriculture	Total Agriculture	Total Range	Deciduous Forest	Evergreen Forest	Mixed Forest	Total Forest	Total Other (a)	Total Land	Percent of County Land
Strafford, NH	(E)	1	<1	0	0	1	2	<1	<1	1	0	3	10	22	35	1	38	11
	(O)	26	5	<1	3	2	36	37	<1	37	0	6	92	149	841	8	330	89
	(T)	27	5	<1	3	2	37	38	1	39	0	9	102	171	282	9	368	100
System Totals	(E)	198	41	5	19	28	291	158	5	163	0	283	274	1115	1672	51	2177	25
	(O)	480	101	14	43	77	715	422	13	435	1	1912	1098	2244	5254	204	6612	75
	(T)	678	142	18	62	104	1004	580	19	599	2	2195	1372	3359	6926	267	8789	100
BOSTON BAY																		
Essex, MA	(E)	3	4	0	2	2	11	0	0	0	0	6	0	0	6	3	20	4
	(O)	95	16	3	5	12	130	43	<1	43	0	229	5	21	255	47	478	96
	(T)	98	20	3	7	14	142	43	<1	43	0	235	5	21	261	58	498	100
Middlesex, MA	(E)	99	21	3	3	16	142	4	0	4	0	73	<1	1	74	2	224	27
	(O)	122	26	1	7	10	166	44	3	47	0	227	55	89	371	15	599	73
	(T)	221	47	4	10	27	289	48	3	51	0	300	55	90	445	17	823	100
Norfolk, MA	(E)	100	19	2	5	9	135	11	<1	11	0	172	0	4	176	6	329	82
	(O)	11	1	<1	1	1	14	3	0	3	0	38	0	13	51	1	71	18
	(T)	111	20	2	6	10	149	14	<1	14	0	211	0	18	229	7	400	100
Plymouth, MA	(E)	12	2	<1	<1	1	16	0	0	0	0	17	0	0	17	2	35	5
	(O)	84	9	<1	7	9	109	40	<1	40	1	171	39	222	432	42	626	95
	(T)	96	11	1	8	9	124	40	<1	40	1	188	39	222	449	44	661	100
Suffolk, MA	(E)	32	11	2	5	5	55	<1	0	0	3	3	0	0	3	3	59	100
	(O)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(T)	32	11	2	5	5	55	<1	0	0	3	3	0	0	3	3	59	100
Worcester, MA	(E)	3	<1	0	<1	0	4	<1	0	0	0	10	0	0	10	1	14	1
	(O)	116	29	5	12	19	181	130	6	136	0	837	130	145	1112	77	1508	99
	(T)	119	30	5	12	20	186	130	6	136	0	847	130	145	1122	77	1523	100
System Totals	(E)	250	56	7	16	32	361	15	<1	15	0	281	<1	5	286	17	682	17
	(O)	427	82	11	32	52	604	261	9	270	2	1502	229	490	2221	184	3282	83
	(T)	677	139	18	48	86	968	276	9	285	2	1783	229	496	2508	202	3964	100
CAPE COD BAY																		
Barnstable, MA	(E)	20	3	0	<1	5	28	0	0	0	5	15	25	26	66	26	124	32
	(O)	58	11	<1	4	13	86	3	0	3	4	29	29	91	149	28	268	68
	(T)	78	13	<1	4	19	114	3	0	3	8	43	53	117	213	52	393	100
Norfolk, MA	(E)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(O)	111	20	2	6	10	149	14	<1	14	0	211	0	18	229	7	400	100
	(T)	111	20	2	6	10	149	14	<1	14	0	211	0	18	229	7	400	100

Abbreviations: E, estuarine drainage area; O, area outside the estuarine drainage area; T, totals.
Note: All values are rounded.
(a) Includes barren lands and wetlands.

Appendix 2

Table 1. Land Use by Counties within Estuarine Drainage Areas

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Estuary/County		Residential	Commercial Services	Industrial	Transportation	Other Urban	Total Urban	Cropland/ Pasture	Other Agriculture	Total Agriculture	Total Range	Deciduous Forest	Evergreen Forest	Mixed Forest	Total Forest	Total Other (a)	Total Land	Percent of County Land
Plymouth, MA	(E)	17	<1	<1	1	2	21	2	0	2	0	40	<1	19	59	5	88	13
	(O)	79	10	<1	6	8	103	38	<1	38	1	148	38	203	389	39	572	87
	(T)	96	11	1	8	9	115	40	<1	40	1	188	39	222	449	44	661	100
System Totals	(E)	38	3	<1	2	7	50	2	0	2	5	55	25	45	125	31	213	15
	(O)	248	41	3	17	31	340	55	<1	55	5	387	67	312	766	74	1240	85
	(T)	285	44	3	18	39	389	57	<1	57	10	442	92	357	891	98	1453	100
BUZZARDS BAY																		
Barnstable, MA	(E)	10	2	0	<1	0	12	0	0	0	0	3	0	20	23	6	39	10
	(O)	69	11	<1	3	18	101	3	0	3	8	40	53	97	190	50	354	90
	(T)	78	13	<1	4	19	114	3	0	3	8	43	53	117	213	52	393	100
Bristol, MA	(E)	17	2	<1	2	6	27	14	0	14	4	30	4	35	69	8	125	22
	(O)	47	9	3	6	12	77	39	<1	39	1	165	14	116	295	26	439	78
	(T)	64	11	4	9	19	107	53	<1	53	5	196	18	151	335	35	564	100
Plymouth, MA	(E)	11	<1	<1	2	2	16	16	0	16	0	18	14	111	143	13	190	29
	(O)	85	10	<1	5	7	107	24	<1	24	0	170	25	111	306	30	471	71
	(T)	96	11	1	8	9	123	40	<1	40	1	188	39	222	449	44	661	100
Newport, RI	(E)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(O)	15	6	<1	<1	5	27	30	0	30	8	32	<1	2	34	3	103	100
	(T)	15	6	<1	<1	5	27	30	0	30	8	32	<1	2	34	3	103	100
System Totals	(E)	38	5	1	5	9	56	30	0	30	4	51	17	166	234	25	354	21
	(O)	216	36	5	16	42	215	96	<1	96	18	408	93	325	826	113	1367	79
	(T)	254	41	6	21	52	374	126	<1	126	22	459	110	492	1061	138	1721	100
NARRAGANSETT BAY																		
Bristol, MA	(E)	40	8	3	5	10	58	32	<1	32	0	130	11	104	245	22	364	65
	(O)	25	3	2	4	9	315	21	0	21	4	66	7	47	120	14	201	35
	(T)	64	11	4	9	19	374	53	<1	53	5	196	18	151	365	35	564	100
Norfolk, MA	(E)	9	1	<1	<1	0	66	1	0	1	0	23	0	13	36	1	50	13
	(O)	102	19	2	8	9	43	13	<1	13	0	187	0	4	191	6	349	87
	(T)	111	20	2	6	10	107	14	<1	14	0	211	0	18	229	7	400	100
Plymouth, MA	(E)	32	5	<1	2	2	11	20	<1	20	0	36	24	80	140	14	217	33
	(O)	64	5	<1	6	7	138	20	0	20	0	152	14	142	308	30	444	67
	(T)	96	11	1	8	9	149	40	<1	40	1	188	39	222	449	44	661	100
Bristol, RI	(E)	9	<1	<1	0	4	41	6	0	6	0	5	0	0	5	1	25	100
	(O)	0	0	0	0	0	82	0	0	0	0	0	0	0	0	0	0	0
	(T)	9	<1	<1	0	4	125	6	0	6	0	5	0	0	5	1	25	100

Abbreviations: E, estuarine drainage area; O, area outside estuarine drainage area; T, totals.
Note: All values are rounded.
(a) Includes barren lands and wetlands.

Appendix 2

Table 1. Land Use by Counties within Estuarine Drainage Areas

DRAFT 11/87

Estuary/County		Residential	Commercial Services	Industrial	Transportation	Other Urban	Total Urban	Cropland/ Pasture	Other Agriculture	Total Agriculture	Total Range	Deciduous Forest	Evergreen Forest	Mixed Forest	Total Forest	Total Other (a)	Total Land	Percent of County Land
Kent, RI	(E)	26	4	<1	4	8	14	4	0	4	0	51	9	13	73	3	123	73
	(O)	<1	0	<1	<1	0	0	1	0	1	0	31	3	10	44	1	47	27
	(T)	26	4	<1	4	8	14	5	0	5	0	81	12	24	117	3	169	100
Newport, RI	(E)	14	6	<1	<1	5	42	24	0	24	7	16	<1	1	17	2	77	75
	(O)	1	<1	0	<1	1	1	6	0	6	0	16	<1	<1	17	1	26	25
	(T)	15	6	<1	<1	5	42	30	0	30	8	32	<1	2	34	3	103	100
Providence, RI	(E)	47	9	4	5	10	26	8	1	9	0	127	6	20	153	2	241	58
	(O)	18	3	<1	1	4	3	5	<1	5	0	101	7	34	142	2	175	42
	(T)	64	12	5	6	13	27	13	1	14	0	228	12	54	294	4	416	100
Washington, RI	(E)	8	6	<1	<1	2	75	3	<1	3	0	30	<1	2	32	2	54	16
	(O)	16	4	<1	2	4	26	23	<1	23	9	164	14	24	202	20	279	84
	(T)	24	9	<1	2	6	100	25	<1	25	9	194	15	26	235	21	333	100
System Totals	(E)	184	40	9	17	44	294	98	2	100	10	416	50	234	700	49	1151	43
	(O)	226	34	5	18	34	26	88	<1	88	14	718	46	262	1026	75	1521	57
	(T)	410	73	14	36	77	41	186	2	188	24	1134	96	496	1726	123	2672	100
GARDINERS BAY																		
Suffolk, NY	(E)	38	5	<1	5	5	294	33	<1	33	9	98	<1	0	98	9	203	22
	(O)	323	58	1	29	23	317	63	4	67	3	158	<1	0	158	44	706	78
	(T)	361	63	1	34	29	610	96	4	100	12	255	<1	0	255	54	910	100
System Totals	(E)	38	5	<1	5	5	53	33	<1	33	9	98	<1	0	98	9	203	22
	(O)	323	58	1	29	23	434	63	4	67	3	158	1	0	159	44	706	78
	(T)	361	63	1	34	29	488	96	4	100	12	255	<1	0	255	54	910	100
LONG ISLAND SOUND																		
Fairfield, CT	(E)	248	21	7	5	17	298	33	<1	33	252	252	2	258	258	6	599	96
	(O)	4	<1	0	<1	0	5	2	0	2	0	18	0	0	18	0	24	4
	(T)	252	21	7	5	17	302	35	<1	35	2	270	2	4	276	6	623	100
Hartford, CT	(E)	91	22	11	<1	41	165	80	<1	80	20	166	<1	25	191	40	497	66
	(O)	15	0	2	2	5	24	42	<1	42	0	133	3	40	176	7	253	34
	(T)	106	22	13	3	45	189	123	1	124	20	299	3	65	367	49	749	100
Litchfield, CT	(E)	24	14	6	0	20	64	162	<1	162	28	355	23	0	378	57	591	76
	(O)	7	7	0	0	2	16	25	0	25	0	144	15	8	167	8	217	24
	(T)	31	21	6	0	22	80	187	<1	187	28	499	39	8	546	62	908	100
Middlesex, CT	(E)	35	6	1	4	4	50	44	<1	44	0	262	1	2	265	6	368	1uu
	(O)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(T)	35	6	1	4	4	50	44	<1	44	0	262	1	2	265	7	368	100

Abbreviations: E, estuarine drainage area; O, area outside the estuarine drainage area; T, totals.
Note: All values are rounded.
(a) Includes barren lands and wetlands.

Appendix 2

Table 1. Land Use by Counties within Estuarine Drainage Areas

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Estuary/County		Residential	Commercial Services	Industrial	Transportation	Other Urban	Total Urban	Cropland/ Pasture	Other Agriculture	Total Agriculture	Total Range	Deciduous Forest	Evergreen Forest	Mixed Forest	Total Forest	Total Other (a)	Total Land	Percent of County Land
New Haven, CT	(E)	144	24	10	10	18	206	70	3	100	0	303	<1	5	308	13	100	100
	(O)	<1	0	0	0	0	0	<1	0	0	0	<1	0	0	0	0	0	0
	(T)	144	24	10	10	18	206	70	3	100	0	303	<1	5	308	13	602	100
New London, CT	(E)	50	11	3	10	6	80	79	1	80	0	415	8	14	437	17	614	93
	(O)	1	<1	<1	<1	1	3	5	0	5	0	34	<1	3	37	2	48	7
	(T)	52	11	3	11	6	83	83	1	84	0	449	9	18	476	19	661	100
Tolland, CT	(E)	28	22	7	7	4	68	35	8	43	0	221	2	30	253	19	383	97
	(O)	0	0	0	0	0	0	0	0	0	0	13	0	0	13	0	13	3
	(T)	28	22	7	7	4	68	35	8	43	0	233	2	30	265	19	396	100
Windham, CT	(E)	74	0	2	2	7	85	99	4	103	0	200	33	48	281	39	507	99
	(O)	<1	0	<1	<1	0	1	1	<1	1	0	3	1	1	5	1	8	1
	(T)	74	0	2	2	7	85	100	4	104	0	202	34	50	286	40	515	100
Berkshire, MA	(E)	41	6	1	4	6	58	78	<1	78	0	198	133	4	335	21	491	53
	(O)	19	3	<1	<1	3	26	37	<1	37	0	251	108	3	362	14	441	47
	(T)	61	9	2	4	9	85	115	<1	115	0	449	241	7	697	34	932	100
Hampden, MA	(E)	43	9	3	3	5	63	16	<1	16	0	74	5	<1	79	6	168	27
	(O)	49	16	5	7	5	82	42	2	44	0	222	80	12	314	16	455	73
	(T)	93	25	8	10	10	146	58	3	61	0	296	85	12	393	24	624	100
Worcester, MA	(E)	15	3	<1	3	2	23	14	<1	14	0	95	9	41	145	9	193	13
	(O)	105	28	5	9	18	165	117	5	121	0	751	121	104	976	68	1330	87
	(T)	119	30	5	12	20	186	130	6	136	0	847	130	145	1113	77	1523	100
Bronx, NY	(E)	16	6	<1	5	5	32	0	0	0	0	0	0	0	0	1	34	81
	(O)	4	1	<1	2	2	9	0	0	0	0	0	0	0	0	0	9	19
	(T)	19	7	<1	7	7	40	0	0	0	0	0	0	0	0	1	42	100
Columbia, NY	(E)	<1	0	0	<1	0	1	3	0	3	0	23	3	<1	26	0	30	5
	(O)	52	4	<1	6	2	64	243	15	258	0	178	77	18	273	8	604	95
	(T)	53	4	<1	6	2	65	246	15	261	0	200	80	18	298	9	634	100
Dutchess, NY	(E)	3	1	<1	<1	1	6	70	0	70	0	95	3	4	102	1	179	22
	(O)	49	7	1	4	8	69	204	5	209	0	319	5	14	338	3	621	78
	(T)	52	8	1	4	8	73	274	5	279	0	415	8	19	442	4	800	100
Manhattan, NY	(E)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	(O)	1	4	<1	5	13	23	0	0	0	0	0	0	0	0	0	24	98
	(T)	1	4	<1	5	13	23	0	0	0	0	0	0	0	0	0	24	100
Nassau, NY	(E)	50	7	<1	<1	5	63	6	<1	6	0	11	0	0	11	1	83	29
	(O)	114	31	2	14	17	178	3	<1	3	0	5	<1	0	5	23	208	71
	(T)	165	38	2	14	22	241	9	<1	9	0	16	<1	0	16	25	291	100

Abbreviations: E, estuarine drainage area; O, area outside the estuarine drainage area; T, totals.
Note: All values are rounded.
(a) Includes barren lands and wetlands.

Appendix 2

Table 1. Land Use by Counties within Estuarine Drainage Areas

DRAFT 11/87

Estuary/County		Residential	Commercial Services	Industrial	Transportation	Other Urban	Total Urban	Cropland/ Pasture	Other Agriculture	Total Agriculture	Total Range	Deciduous Forest	Evergreen Forest	Mixed Forest	Total Forest	Total Other (a)	Total Land	Percent of County Land
Putnam, NY	(E)	1	0	0	0	0	1	2	0	2	0	2	0	0	2	0	5	2
	(O)	19	1	<1	2	1	23	17	<1	17	0	170	<1	11	181	3	226	98
	(T)	20	1	<1	2	1	24	19	<1	19	0	172	<1	11	183	3	231	100
Queens, NY	(E)	4	1	<1	2	0	7	0	0	0	0	0	0	0	0	0	9	9
	(O)	56	12	4	16	9	97	0	0	0	0	0	0	0	0	5	100	91
	(T)	61	13	4	18	9	105	0	0	0	0	0	0	0	0	5	110	100
Suffolk, NY	(E)	82	10	<1	1	5	98	8	<1	8	0	18	0	0	18	6	131	14
	(O)	279	53	<1	32	24	388	89	4	93	11	238	<1	0	238	48	779	86
	(T)	361	63	1	34	29	488	96	4	100	12	255	<1	0	255	54	910	100
Westchester, NY	(E)	39	9	<1	5	4	57	<1	0	0	0	2	0	0	2	0	60	14
	(O)	97	15	4	7	20	143	27	<1	27	0	207	<1	5	212	2	384	86
	(T)	135	24	4	12	24	199	28	<1	28	0	209	<1	5	214	2	443	100
Kent, RI	(E)	<1	0	0	<1	0	1	<1	0	0	0	7	2	5	14	0	14	8
	(O)	26	4	<1	4	8	42	4	0	4	0	75	11	19	105	3	156	92
	(T)	26	4	<1	4	8	42	5	0	5	0	81	12	24	117	3	169	100
Providence, RI	(E)	<1	0	<1	0	1	2	1	0	1	0	29	1	6	36	0	38	9
	(O)	64	12	5	6	13	100	12	1	13	0	199	11	48	258	4	379	91
	(T)	64	12	5	6	14	101	13	1	14	0	228	12	54	294	4	416	100
Washington, RI	(E)	0	0	0	0	0	0	0	0	0	0	<1	<1	<1	1	0	1	0
	(O)	24	9	<1	2	6	41	25	<1	25	9	193	14	26	233	21	332	100
	(T)	24	9	<1	2	6	41	25	<1	25	9	194	15	26	235	21	333	100
System Totals	(E)	988	171	54	62	143	1418	801	21	822	52	2727	225	190	3142	249	5693	46
	(O)	986	207	31	119	157	1500	895	35	930	21	3153	449	313	3915	242	6610	54
	(T)	1974	378	86	181	312	2768	1696	56	1752	73	5880	675	503	7058	491	12304	100

Abbreviations: E, estuarine drainage area; O, area outside the estuarine drainage area; T, totals
Note: All values are rounded.
(a) Includes barren lands and wetlands.

Appendix 2

Table 2. Population by Counties within Estuarine Drainage Areas

Draft 11/87

Estuary	County in Estuarine Drainage Area (EDA)	Residential Land in EDA (sq. mi.)	Residential Land in County (sq. mi.)	Percent Residential Land in EDA	Population						
					1970	1980	1985	Percent Change 1970-1980	Percent Change 1980-1985	Percent Change 1970-1985	Density (per sq. mi.) 1985
PASSAMAQUODDY BAY	AROOSTOOK, ME.	0	37	0	0	0	0	0.0	0.0	0.0	0.0
	HANCOCK, ME.	0	65	0	0	0	0	0.0	0.0	0.0	0.0
	PENOBSCOT, ME.	0	45	0	0	0	0	0.0	0.0	0.0	0.0
	WASHINGTON, ME.	7	16	44	13,063	15,296	15,006	17.1	-1.9	14.9	12.6
	TOTAL				13,063	15,296	15,006	17.1	-1.9	14.9	11.1
ENGLISHMAN BAY	HANCOCK, ME.	5	65	8	2,661	3,214	3,392	20.8	5.6	27.5	45.8
	WASHINGTON, ME.	3	16	19	5,599	6,556	6,431	17.1	-1.9	14.9	8.9
	TOTAL				8,259	9,769	9,824	18.3	0.6	18.9	12.3
NARRAGUAGUS BAY	HANCOCK, ME.	0.5	65	1	266	321	339	20.8	5.6	27.5	3.1
	WASHINGTON, ME.	3	16	19	5,599	6,556	6,431	17.1	-1.9	14.9	24.5
	TOTAL				5,865	6,877	6,770	17.3	-1.5	15.4	18.2
BLUE HILL BAY	HANCOCK, ME.	21	65	32	11,175	13,498	14,248	20.8	5.6	27.5	24.2
	PENOBSCOT, ME.	0.5	45	1	1,393	1,522	1,534	9.3	0.8	10.1	73.1
	TOTAL				12,568	15,021	15,782	19.5	5.1	25.6	26.0
PENOBSCOT BAY	AROOSTOOK, ME.	0.5	37	1	1,271	1,234	1,196	-2.9	-3.1	-5.9	29.2
	HANCOCK, ME.	25	65	38	13,304	16,070	16,962	20.8	5.6	27.5	33.5
	KNOX, ME.	7	20	35	10,155	11,529	12,180	13.5	5.6	19.9	213.7
	PENOBSCOT, ME.	37	45	82	103,101	112,657	113,549	9.3	0.8	10.1	65.7
	PISCATAQUIS, ME.	0.5	6	8	1,357	1,470	1,500	8.3	2.1	10.5	40.5
	WALDO, ME.	12	14	86	19,995	24,355	25,286	21.8	3.8	26.5	63.2
	TOTAL				149,183	167,314	170,672	12.2	2.0	14.4	61.6
MUSCONGUS BAY	KNOX, ME.	9	20	45	13,056	14,823	15,660	13.5	5.6	19.9	68.7
	LINCOLN, ME.	4	15	27	5,477	6,851	7,520	25.1	9.8	37.3	91.7
	WALDO, ME.	0.5	14	4	833	1,015	1,054	21.8	3.8	26.5	11.2
	TOTAL				19,366	22,689	24,234	17.2	6.8	25.1	60.0

Abbreviations: Estuarine Drainage Area, EDA; Square Miles, sq. mi.

Table 2. continued. Population by Counties within Estuarine Drainage Areas

Draft 11/87

Estuary	County in Estuarine Drainage Area (EDA)	Residential Land in EDA (sq. mi.)	Residential Land in County (sq. mi.)	Percent Residential Land in EDA	Population						
					1970	1980	1985	Percent Change 1970-1980	Percent Change 1980-1985	Percent Change 1970-1985	Density (per sq. mi.) 1985
SHEEPSCOT BAY	ANDROSCOGGIN, ME.	20	21	95	86,932	94,770	95,810	9.0	1.1	10.2	215.8
	CUMBERLAND, ME.	4	88	5	8,751	9,809	10,286	12.1	4.9	17.5	131.9
	FRANKLIN, ME.	7	10	70	15,711	19,234	20,300	22.4	5.5	29.2	22.4
	KENNEBEC, ME.	33	33	100	95,247	109,889	112,400	15.4	2.3	18.0	129.2
	KNOX, ME.	0.5	20	3	725	824	870	13.5	5.6	19.9	19.3
	LINCOLN, ME.	11	15	73	15,060	18,840	20,680	25.1	9.8	37.3	57.0
	OXFORD, ME.	9	14	64	27,937	31,528	32,143	12.9	2.0	15.1	30.6
	PENOBSCOT, ME.	3	45	7	8,360	9,134	9,207	9.3	0.8	10.1	47.5
	PISCATAQUIS, ME.	0.5	6	8	1,357	1,470	1,500	8.3	2.1	10.5	20.0
	SAGADAHOC, ME.	3	7	43	10,051	12,341	12,943	22.8	4.9	28.8	64.7
	SOMERSET, ME.	12	13	92	37,474	41,584	43,292	11.0	4.1	15.5	33.3
	WALDO, ME.	1	14	7	1,666	2,030	2,107	21.8	3.8	26.5	9.0
	CARROLL, NH.	0	29	0	0	0	0	0.0	0.0	0.0	0.0
	COOS, NH.	0	8	0	0	0	0	0.0	0.0	0.0	0.0
	TOTAL				309,272	351,451	361,538	13.6	2.9	16.9	61.9
CASCO BAY	ANDROSCOGGIN, ME.	0.5	21	2	2,173	2,369	2,395	9.0	1.1	10.2	88.7
	CUMBERLAND, ME.	88	88	100	192,528	215,789	226,300	12.1	4.9	17.5	309.2
	OXFORD, ME.	0.5	14	4	1,552	1,752	1,786	12.9	2.0	15.1	14.0
	SAGADAHOC, ME.	4	7	57	13,401	16,454	17,257	22.8	4.9	28.8	308.2
	YORK, ME.	2	79	3	2,825	3,538	3,876	25.2	9.6	37.2	107.7
	TOTAL				212,479	239,902	251,614	12.9	4.9	18.4	257.0
SACO BAY	CUMBERLAND, ME.	9	88	10	19,690	22,069	23,144	12.1	4.9	17.5	180.8
	OXFORD, ME.	5	14	36	15,520	17,515	17,857	12.9	2.0	15.1	53.3
	YORK, ME.	25	79	32	35,309	44,221	48,449	25.2	9.6	37.2	118.2
	CARROLL, NH.	15	29	52	9,594	14,447	15,931	50.6	10.3	66.1	22.1
	COOS, NH.	0	8	0	0	0	0	0.0	0.0	0.0	0.0
	GRAFTON, NH.	0	22	0	0	0	0	0.0	0.0	0.0	0.0
	TOTAL				80,113	98,253	105,382	22.6	7.3	31.5	61.2
GREAT BAY	YORK, ME.	11	79	14	15,536	19,457	21,318	25.2	9.6	37.2	150.1
	CARROLL, NH.	3	29	10	1,919	2,834	3,186	47.7	12.4	66.1	72.4
	ROCKINGHAM, NH.	24	59	41	56,522	77,428	87,051	37.0	12.4	54.0	239.2
	STRAFFORD, NH.	26	27	96	67,822	82,245	88,496	21.3	7.6	30.5	268.2
	TOTAL				141,800	181,964	200,051	28.3	9.9	41.1	227.3

Abbreviations: Estuarine Drainage Area, EDA; Square Miles, sq. mi.

Table 2. continued. Population by Counties within Estuarine Drainage Areas

Draft 11/87

Estuary	County in Estuarine Drainage Area (EDA)	Residential Land in EDA (sq. mi.)	Residential Land in County (sq. mi.)	Percent Residential Land in EDA	Population						
					1970	1980	1985	Percent Change 1970-1980	Percent Change 1980-1985	Percent Change 1970-1985	Density (per sq. mi.) 1985
MERRIMACK RIVER	ESSEX, MA.	35	98	36	227,817	226,317	232,286	-0.7	2.6	2.0	1,498.6
	MIDDLESEX, MA.	40	221	18	252,899	247,427	248,217	-2.2	0.3	-1.9	1,410.3
	WORCESTER, MA.	0.5	119	0	2,681	2,716	2,754	1.3	1.4	2.7	306.0
	BELKNAP, NH.	21	23	91	29,552	39,155	42,274	32.5	8.0	43.0	130.1
	CARROLL, NH.	12	29	41	7,675	11,558	12,745	50.6	10.3	66.1	89.1
	GRAFTON, NH.	0	22	0	0	0	0	0.0	0.0	0.0	0.0
	HILLSBOROUGH, NH.	43	53	81	181,688	224,418	245,830	23.5	9.5	35.3	432.0
	MERRIMACK, NH.	19	28	68	54,913	66,705	71,929	21.5	7.8	31.0	153.4
	ROCKINGHAM, NH.	28	59	47	65,943	90,333	101,559	37.0	12.4	54.0	350.2
	STRAFFORD, NH.	1	27	4	2,609	3,163	3,404	21.3	7.6	30.5	89.6
	TOTAL				825,777	911,792	960,998	10.4	5.4	16.4	441.4
BOSTON BAY	ESSEX, MA.	3	98	3	19,527	19,399	19,910	-0.7	2.6	2.0	995.5
	MIDDLESEX, MA.	99	221	45	625,925	612,382	614,338	-2.2	0.3	-1.9	2,742.6
	NORFOLK, MA.	100	111	90	545,091	546,475	542,793	0.3	-0.7	-0.4	1,649.8
	PLYMOUTH, MA.	12	96	13	41,664	50,680	52,563	21.6	3.7	26.2	1,501.8
	SUFFOLK, MA.	32	32	100	735,190	650,142	667,200	-11.6	2.6	-9.2	11,308.5
	WORCESTER, MA.	3	119	3	16,083	16,295	16,525	1.3	1.4	2.7	1,180.4
	TOTAL				1,983,481	1,895,371	1,913,328	-4.4	0.9	-3.5	2,805.5
CAPE COD BAY	BARNSTABLE, MA.	20	78	26	24,784	37,929	42,487	53.0	12.0	71.4	342.6
	PLYMOUTH, MA.	17	96	18	59,024	71,796	74,464	21.6	3.7	26.2	846.2
	TOTAL				83,808	109,726	116,951	30.9	6.6	39.5	551.7
BUZZARDS BAY	BARNSTABLE, MA.	10	78	13	12,392	18,965	21,244	53.0	12.0	71.4	544.7
	BRISTOL, MA.	17	64	27	118,017	126,077	127,580	6.8	1.2	8.1	1,020.6
	PLYMOUTH, MA.	11	96	11	38,192	46,456	48,182	21.6	3.7	26.2	253.6
	TOTAL				168,601	191,498	197,006	13.6	2.9	16.8	556.5

Abbreviations: Estuarine Drainage Area, EDA; Square Miles, sq. mi.

Table 2. continued. Population by Counties within Estuarine Drainage Areas

Draft 11/87

Estuary	County in Estuarine Drainage Area (EDA)	Residential Land in EDA (sq. mi.)	Residential Land in County (sq. mi.)	Percent Residential Land in EDA	Population						
					1970	1980	1985	Percent Change 1970-1980	Percent Change 1980-1985	Percent Change 1970-1985	Density (per sq. mi.) 1985
NARRAGANSETT BAY	BRISTOL, MA.	40	64	63	277,688	296,651	300,188	6.8	1.2	8.1	824.7
	NORFOLK, MA.	9	111	8	49,058	49,183	48,851	0.3	-0.7	-0.4	977.0
	PLYMOUTH, MA.	32	96	33	111,105	135,146	140,167	21.6	3.7	26.2	645.9
	BRISTOL, RI.	9	9	100	45,937	46,942	47,400	2.2	1.0	3.2	1,896.0
	KENT, RI.	26	26	100	142,382	154,163	158,700	8.3	2.9	11.5	1,290.2
	NEWPORT, RI.	14	15	93	88,255	75,957	78,867	-13.9	3.8	-10.6	1,024.2
	PROVIDENCE, RI.	47	64	73	426,129	419,584	424,689	-1.5	1.2	-0.3	1,762.2
	WASHINGTON, RI.	8	24	33	28,569	31,106	33,100	8.9	6.4	15.9	613.0
	TOTAL				1,169,123	1,208,732	1,231,961	3.4	1.9	5.4	1,070.3
GARDINERS BAY	SUFFOLK, NY.	38	361	11	118,416	135,182	138,242	14.2	2.3	16.7	681.0
	TOTAL				118,416	135,182	138,242	14.2	2.3	16.7	681.0
LONG ISLAND SOUND	FAIRFIELD, CT.	248	252	98	780,230	794,331	808,559	1.8	1.8	3.6	1,349.8
	HARTFORD, CT.	91	106	86	701,161	693,459	704,048	-1.1	1.5	0.4	1,416.6
	LITCHFIELD, CT.	24	31	77	111,554	121,370	124,103	8.8	2.3	11.2	179.6
	MIDDLESEX, CT.	35	35	100	114,816	129,017	134,900	12.4	4.6	17.5	366.6
	NEW HAVEN, CT.	144	144	100	744,948	761,325	775,600	2.2	1.9	4.1	1,290.5
	NEW LONDON, CT.	50	52	96	221,488	229,239	236,731	3.5	3.3	6.9	385.6
	TOLLAND, CT.	28	28	100	103,440	114,823	119,200	11.0	3.8	15.2	311.2
	WINDHAM, CT.	74	74	100	84,515	92,312	95,700	9.2	3.7	13.2	188.8
	BERKSHIRE, MA.	41	61	67	100,418	97,533	95,510	-2.9	-2.1	-4.9	194.5
	HAMPDEN, MA.	43	93	46	212,249	204,836	205,383	-3.5	0.3	-3.2	1,222.5
	WORCESTER, MA.	15	119	13	80,416	81,473	82,626	1.3	1.4	2.7	428.1
	BRONX, NY.	16	19	84	1,239,318	984,397	997,221	-20.6	1.3	-19.5	29,330.0
	COLUMBIA, NY.	0.5	53	1	486	561	572	15.5	1.9	17.6	19.1
	DUTCHESS, NY.	3	52	6	12,825	14,138	14,717	10.2	4.1	14.8	82.2
	NASSAU, NY.	50	165	30	432,750	400,479	403,424	-7.5	0.7	-6.8	4,860.5
	PUTNAM, NY.	1	20	5	2,835	3,860	4,045	36.2	4.8	42.7	809.0
	QUEENS, NY.	4	61	7	130,261	124,021	126,754	-4.8	2.2	-2.7	14,083.8
	SUFFOLK, NY.	82	361	23	255,529	291,709	298,312	14.2	2.3	16.7	2,277.2
	WEST CHESTER, NY.	39	135	29	258,297	250,351	250,033	-3.1	-0.1	-3.2	4,167.2
	KENT, RI.	0.5	26	2	2,738	2,965	3,052	8.3	2.9	11.5	218.0
	PROVIDENCE, RI.	0.5	64	1	4,533	4,464	4,518	-1.5	1.2	-0.3	118.9
	TOTAL				5,594,806	5,396,664	5,485,008	-3.5	1.6	-2.0	963.1

Abbreviations: Estuarine Drainage Area, EDA; Square Mile, sq. mi.

Appendix 2

Table 3. Harvested Cropland by Counties within Estuarine Drainage Areas — Draft 11/87

Estuary	County	Cropland/Pastureland (sq. mi.) (1)			Harvested Cropland (sq. mi.) in EDA (2)			
		In EDA Portion of County	In entire County	Percent in EDA	1978	1982	Difference	Percent Change
PASSAMAQUODDY BAY	AROOSTOOK, ME.	1	761	0	0.4	0.3	0.0	-7.5
	HANCOCK, ME.	0	20	0	0.0	0.0	0.0	0.0
	PENOBSCOT, ME.	1	192	1	0.4	0.4	0.0	-1.2
	WASHINGTON, ME.	51	125	41	10.3	10.4	0.1	1.0
	TOTAL				11.0	11.1	0.1	0.7
ENGLISHMAN BAY	HANCOCK, ME.	1	20	5	0.5	0.5	0.1	11.4
	WASHINGTON, ME.	33	125	26	6.7	6.7	0.1	1.0
	TOTAL				7.1	7.3	0.1	1.7
NARRAGUAGUS BAY	HANCOCK, ME.	0	20	0	0.0	0.0	0.0	0.0
	WASHINGTON, ME.	24	125	19	4.9	4.9	0.1	1.0
	TOTAL				4.9	4.9	0.1	1.0
BLUE HILL BAY	HANCOCK, ME.	8	20	40	3.8	4.2	0.4	11.4
	PENOBSCOT, ME.	0	192	0	0.0	0.0	0.0	0.0
	TOTAL				3.8	4.2	0.4	11.4
PENOBSCOT BAY	AROOSTOOK, ME.	2	761	0	0.7	0.7	-0.1	-7.5
	HANCOCK, ME.	8	20	40	3.8	4.2	0.4	11.4
	KNOX, ME.	5	36	14	1.4	1.6	0.1	10.3
	PENOBSCOT, ME.	120	192	63	44.3	43.7	-0.5	-1.2
	PISCATAQUIS, ME.	1	62	2	0.2	0.2	0.0	3.5
	WALDO, ME.	32	70	46	16.3	16.6	0.3	1.9
	TOTAL				66.8	67.1	0.3	0.4
MUSCONGUS BAY	KNOX, ME.	22	36	61	6.4	7.0	0.7	10.3
	LINCOLN, ME.	6	40	15	1.8	2.0	0.1	7.5
	WALDO, ME	7	70	10	3.6	3.6	0.1	1.9
	TOTAL				11.8	12.6	0.9	7.3

Abbreviations: Estuarine Drainage Area, EDA; Square Miles, sq. mi.

(1) Includes harvested, cultivated, idle, and other cropland and permanent pasture-U.S. Geological Survey

(2) Includes land from which crops were harvested and land in orchards and nurseries-Bureau of the Census

Table 3. continued. Harvested Cropland by Counties within Estuarine Drainage Areas — Draft 11/87

Estuary	County	Cropland/Pastureland (sq. mi.) (1)			Harvested Cropland (sq. mi.) In EDA (2)			
		In EDA Portion of County	In entire County	Percent in EDA	1978	1982	Difference	Percent Change
SHEEPSCOT BAY	ANDROSCOGGIN, ME.	82	87	94	31.6	35.6	4.0	12.6
	CUMBERLAND, ME.	10	93	11	3.4	3.6	0.1	3.8
	FRANKLIN, ME.	44	50	88	17.2	17.0	-0.2	-0.9
	KENNEBEC, ME.	129	129	100	60.6	61.6	1.1	1.8
	KNOX, ME.	4	36	11	1.2	1.3	0.1	10.3
	LINCOLN, ME.	32	40	80	9.8	10.5	0.7	7.5
	OXFORD, ME.	45	61	74	23.3	22.6	-0.7	-2.8
	PENOBSCOT, ME.	35	192	18	12.9	12.8	-0.2	-1.2
	PISCATAQUIS, ME.	8	62	13	1.7	1.8	0.1	3.5
	SAGADAHOC, ME.	30	33	91	7.9	7.9	0.0	0.3
	SOMERSET, ME.	119	122	98	53.6	54.1	0.5	0.8
	WALDO, ME.	31	70	44	15.8	16.1	0.3	1.9
	CARROLL, NH.	0	25	0	0.0	0.0	0.0	0.0
	COOS, NH.	0.5	70	1	0.2	0.2	0.0	-12.0
	TOTAL				239.2	245.1	5.9	2.5
CASCO BAY	ANDROSCOGGIN, ME.	5	87	6	1.9	2.2	0.2	12.6
	CUMBERLAND, ME.	83	93	89	28.6	29.7	1.1	3.8
	OXFORD, ME.	4	65	6	1.9	1.9	-0.1	-2.8
	SAGADAHOC, ME.	3	33	9	0.8	0.8	0.0	0.3
	YORK, ME.	5	77	6	2.3	2.4	0.1	4.1
	TOTAL				35.6	37.0	1.4	3.8
SACO BAY	CUMBERLAND, ME.	8	93	9	2.8	2.9	0.1	3.8
	OXFORD, ME.	16	65	25	7.8	7.5	-0.2	-2.8
	YORK, ME.	29	77	38	13.6	14.1	0.6	4.1
	CARROLL, NH.	19	25	76	5.6	5.4	-0.2	-3.5
	COOS, NH.	0	71	0	0.0	0.0	0.0	0.0
	GRAFTON, NH.	0	101	0	0.0	0.0	0.0	0.0
	TOTAL				29.6	29.9	0.2	0.8
GREAT BAY	YORK, ME.	11	77	14	5.1	5.4	0.2	4.1
	CARROLL, NH.	2	25	8	0.6	0.6	0.0	-3.5
	ROCKINGHAM, NH.	41	62	66	13.4	12.6	-0.8	-6.2
	STRAFFORD, NH.	37	38	97	14.8	12.2	-2.5	-17.1
	TOTAL				33.9	30.7	-3.2	-9.4

Abbreviations: Estuarine Drainage Area, EDA; Square Miles, sq. mi.

(1) Includes harvested, cultivated, idle, and other cropland and permanent pasture-U.S. Geological Survey

(2) Includes land from which crops were harvested and land in orchards and nurseries-Bureau of the Census

Table 3. continued. Harvested Cropland by Counties within Estuarine Drainage Areas — Draft 11/87

Estuary	County	Cropland/Pastureland (sq. mi.) (1)			Harvested Cropland (sq. mi.) in EDA (2)			
		In EDA Portion of County	In entire County	Percent in EDA	1978	1982	Difference	Percent Change
MERRIMACK RIVER	ESSEX, MA.	21	43	49	9.4	8.9	-0.5	-5.3
	MIDDLESEX, MA.	12	48	25	6.7	6.1	-0.7	-10.2
	WORCESTER, MA.	0.5	130	0	0.3	0.3	0.0	1.8
	BELKNAP, NH.	22	26	85	6.3	5.5	-0.8	-12.6
	CARROLL, NH.	4	25	16	1.2	1.1	0.0	-3.5
	GRAFTON, NH.	0.5	101	0	0.2	0.2	0.0	-1.9
	HILLSBOROUGH, NH.	38	51	75	18.8	17.1	-1.7	-8.9
	MERRIMACK, NH.	39	56	70	17.7	16.1	-1.5	-8.7
	ROCKINGHAM, NH.	20	62	32	6.5	6.1	-0.4	-6.2
	STRAFFORD, NH.	0.5	38	1	0.2	0.2	0.0	-17.1
	TOTAL				67.2	61.6	-5.7	-8.4
BOSTON BAY	ESSEX, MA.	0	43	0	0.0	0.0	0.0	0.0
	MIDDLESEX, MA.	4	48	8	2.2	2.0	-0.2	-10.2
	NORFOLK, MA.	11	14	79	4.6	4.3	-0.3	-6.1
	PLYMOUTH, MA.	0	40	0	0.0	0.0	0.0	0.0
	SUFFOLK, MA.	0.5	0.5	100	0.0	0.0	0.0	0.0
	WORCESTER, MA.	0.5	130	0	0.3	0.3	0.0	1.8
	TOTAL				7.1	6.6	-0.5	-6.9
CAPE COD BAY	BARNSTABLE, MA.	0	3	0	0.0	0.0	0.0	0.0
	PLYMOUTH, MA.	2	40	5	1.4	1.5	0.1	5.9
	TOTAL				1.4	1.5	0.1	5.9
BUZZARDS BAY	BARNSTABLE, MA.	0	3	0	0.0	0.0	0.0	0.0
	BRISTOL, MA.	14	53	26	6.5	6.4	-0.1	-1.0
	PLYMOUTH, MA.	16	40	40	11.4	12.1	0.7	5.9
	TOTAL				17.9	18.5	0.6	3.4

Abbreviations: Estuarine Drainage Area, EDA; Square Miles, sq. mi.

(1) Includes harvested, cultivated, idle, and other cropland and permanent pasture-U.S. Geological Survey

(2) Includes land from which crops were harvested and land in orchards and nurseries-Bureau of the Census

Table 3. continued. Harvested Cropland by Counties within Estuarine Drainage Areas — Draft 11/87

Estuary	County	Cropland/Pastureland (sq. mi.) (1)			Harvested Cropland (sq. mi.) in EDA (2)			
		In EDA Portion of County	In entire County	Percent in EDA	1978	1982	Difference	Percent Change
NARRAGANSETT BAY	BRISTOL, MA.	32	53	60	14.9	14.7	-0.1	-1.0
	NORFOLK, MA.	1	14	7	0.4	0.4	0.0	-6.1
	PLYMOUTH, MA.	20	40	50	14.2	15.1	0.8	5.9
	BRISTOL, RI.	6	6	100	1.7	1.9	0.2	9.9
	KENT, RI.	4	5	80	1.6	1.8	0.2	11.8
	NEWPORT, RI.	24	30	80	8.6	7.8	-0.8	-8.8
	PROVIDENCE, RI.	8	13	62	5.4	4.4	-1.0	-19.0
	WASHINGTON, RI.	3	25	12	1.7	1.5	-0.2	-11.8
	TOTAL				48.5	47.6	-0.9	-1.9
GARDINERS BAY	SUFFOLK, NY.	33	96	34	21.0	19.7	-1.3	-6.1
	TOTAL				21.0	19.7	-1.3	-6.1
LONG ISLAND SOUND	FAIRFIELD, CT.	33	35	94	10.4	8.1	-2.3	-21.9
	HARTFORD, CT.	80	123	65	34.6	32.7	-1.9	-5.6
	LITCHFIELD, CT.	162	187	87	51.1	52.5	1.4	2.7
	MIDDLESEX, CT.	44	44	100	12.7	11.8	-0.9	-6.8
	NEW HAVEN, CT.	70	70	100	24.0	21.8	-2.2	-9.1
	NEW LONDON, CT.	79	83	95	36.8	38.5	1.7	4.5
	TOLLAND, CT.	35	35	100	23.6	29.9	6.3	26.9
	WINDHAM, CT.	99	100	99	42.7	43.8	1.2	2.7
	BERKSHIRE, MA.	78	115	68	25.7	25.8	0.1	0.3
	HAMPDEN, MA.	16	58	28	5.8	5.6	-0.2	-3.2
	WORCESTER, MA.	14	130	11	7.0	7.1	0.1	1.8
	BRONX, NY.	0	0	0	0.0	0.0	0.0	0.0
	COLUMBIA, NY.	3	246	1	1.5	1.5	0.0	-1.9
	DUTCHESS, NY.	70	274	26	23.1	23.2	0.1	0.6
	NASSAU, NY.	6	9	67	0.6	0.0	-0.6	-100.0
	PUTNAM, NY.	2	19	11	0.4	0.6	0.2	57.9
	QUEENS, NY.	0	0	0	0.0	0.0	0.0	0.0
	SUFFOLK, NY.	8	96	8	5.1	4.8	-0.3	-6.1
	WEST CHESTER, NY.	0.5	28	2	0.1	0.1	0.0	-3.1
	KENT, RI.	0.5	5	10	0.2	0.2	0.0	11.8
	PROVIDENCE, RI.	1	13	8	0.7	0.5	-0.1	-19.0
	TOTAL				305.9	308.5	2.6	0.9

Abbreviations: Estuarine Drainage Area, EDA; Square Miles, sq. mi.

(1) Includes harvested, cultivated, idle, and other cropland and permanent pasture-U.S. Geological Survey

(2) Includes land from which crops were harvested and land in orchards and nurseries-Bureau of the Census

Appendix 4

Table 1. Classification of Shellfish Waters and Sources of Contamination by Subarea within Estuaries-1985

Draft 11/87

Estuary	Subarea	Classification				Primary Pollution Sources for Harvest Limited Classification (acres)									
			Harvest Limited			Non-Point						Point			
		Approved	Prohibited	Conditional	Restricted	Boating Shipping	Waste Spills	Urban Runoff	Agriculture Feedlots	Wildlife Forestry	Septics	STP's	Straight Pipes	CSO's Sewer Tie-Ins	Industry
Passamaquoddy Bay	Quoddy Roads	1998	0	0	0	0	0	0	0	0	0	0	0	0	0
	Calais/W.Quoddy Head Open Areas	31390	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carrying Place Cove	0	69	0	0	0	0	0	0	0	69	0	0	0	0
	Bar Harbor	0	482	0	0	0	0	0	0	0	482	0	0	0	0
	Pembroke	0	127	0	0	0	0	0	26	0	127	0	0	0	0
	Reynolds Point	0	26	0	0	0	0	0	0	0	0	0	0	0	0
	Dennys River	0	48	0	0	0	0	0	13	0	48	0	0	0	0
	Crane Mill Brook	0	0	13	0	0	0	0	0	0	0	0	0	0	0
	St. Croix River	0	4203	0	0	0	0	0	0	0	0	4203	0	0	0
	Pleasant Point	0	22	0	0	0	0	0	0	0	0	22	0	0	0
	Whiting Bay	204	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lubec Neck	0	156	0	0	0	0	0	0	0	156	0	0	0	0
	Eastport	0	275	0	0	0	0	0	0	0	275	0	0	0	0
	Broad Cove	0	303	0	0	0	0	0	0	0	303	0	0	0	0
	North Lubec	0	415	0	0	0	0	0	0	0	415	0	0	0	0
	Total	33590	6126	13	0	0	0	0	39	0	1875	4225	0	0	0
Englishman Bay	Holmes Bay	0	41	222	0	0	0	0	0	0	0	263	0	0	0
	Machias River	0	1699	0	0	0	0	0	0	0	0	1699	0	0	0
	Randall Flats	0	0	0	804	0	0	0	0	0	804	0	0	0	0
	Open Bays	51334	0	0	0	0	0	0	0	0	0	0	0	0	0
	Howard Cove	0	257	0	0	0	0	0	0	0	257	0	0	0	0
	Little Machias	5151	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	56485	1997	222	804	0	0	0	0	0	1061	1962	0	0	0
Narraguagus Bay	Jonesport	0	349	0	0	0	0	0	0	0	349	0	0	0	0
	Beals Island	0	115	0	0	0	0	0	0	0	115	0	0	0	0
	Pidgeon Hill Bay	0	0	41	0	0	0	0	0	0	41	0	0	0	0
	Tibbett Narrows/ Open Areas	40872	0	0	0	0	0	0	0	0	0	0	0	0	0
	Open Bays	14683	0	0	0	0	0	0	0	0	0	0	0	0	0
	Narraguagus Bay	0	826	0	0	0	0	0	0	0	826	0	0	0	0
	Total	55555	1290	41	0	0	0	0	0	0	1331	0	0	0	0

Abbreviations: Sewage Treatment Plants, STP's; Combined Sewer Overflows, CSO's

Appendix 4

Table 1. Classification of Shellfish Waters and Sources of Contamination by Subarea within Estuaries-1985 Draft 11/87

Estuary	Subarea	Classification				Primary Pollution Sources for Harvest Limited Classification (acres)									
			Harvest Limited			Non-Point						Point			
		Approved	Prohibited	Conditional	Restricted	Boating Shipping	Waste Spills	Urban Runoff	Agriculture Feedlots	Wildlife Forestry	Septics	STP's	Straight Pipes	CSOs Sewer Tie-Ins	Industry
Blue Hill Bay	Macon River	0	2606	0	0	0	0	0	0	0	2606	2606	0	0	0
	Blue Hill Harbor	0	222	0	0	0	0	0	0	0	0	222	0	0	0
	Bass Harbor	0	20	0	704	0	0	0	0	0	724	0	0	0	0
	East Blue Hill	0	48	0	0	0	0	0	0	0	48	0	0	0	0
	Blue Hill Bay/ Open Areas	71144	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	71144	2896	0	704	0	0	0	0	0	3378	2828	0	0	0
Penobscot Bay	Duck Harbor	0	0	209	0	0	0	0	0	0	209	0	0	0	0
	Ducktrap Harbor	0	60	0	0	0	0	0	0	0	60	0	0	0	0
	Camden Harbor	0	164	0	0	0	0	0	0	0	0	164	0	0	0
	Penobscot River/ Open Areas	73547	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wadsworth Cove	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wadsworth Creek	0	0	158	0	0	0	0	0	0	158	0	0	0	0
	Castine	0	2216	0	0	0	0	0	0	0	0	2216	0	0	0
	Harborside	0	179	0	0	0	0	0	0	0	0	0	0	0	179
	Harbor Island	0	13	306	0	0	0	0	0	0	319	0	0	0	0
	Billings Cove	0	23	0	0	0	0	0	0	0	23	0	0	0	0
	Deer Island Thoroughfare	0	311	0	0	0	0	0	0	0	311	0	0	0	0
	Penobscot Bay/ Open Areas	124425	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gilkey Harbor	0	0	796	0	0	0	0	0	0	796	0	0	0	0
	Sabbath Day Harbor	0	265	0	0	0	0	0	0	0	265	0	0	0	0
	Belfast Bay	0	4794	0	199	0	0	0	0	0	4993	4993	0	0	0
	Searsport	0	360	1492	0	0	1852	0	0	0	1852	1852	0	0	0
	Cape Jellison	0	4570	0	0	0	0	0	0	0	4570	0	0	0	0
	Northern Bay	0	0	0	722	0	0	0	0	0	0	722	0	0	0
	Penobscot River	0	5702	0	1448	0	0	0	0	0	7150	7150	0	0	0
	Gilkey Harbor	0	0	202	0	0	0	0	0	0	202	0	0	0	0
	Rockport Harbor	0	4942	0	0	0	0	0	0	0	4942	0	0	0	0
	Rockland Harbor	0	2275	0	0	0	0	0	0	0	0	0	0	0	2275
	Pulpit Harbor	0	123	0	0	0	0	0	0	0	123	0	123	0	0
	North Haven	0	826	0	0	0	0	0	0	0	826	0	0	0	0
	Deer Island	0	80	0	0	0	0	0	0	0	80	0	0	0	0
	Center Harbor	0	101	0	0	0	0	0	0	0	101	0	0	0	0
	Morse Cove	0	0	0	890	0	0	0	0	0	890	890	0	0	0
	Inner Harbor	0	77	0	0	0	0	0	0	0	77	0	0	0	0
	Stonington	0	268	0	0	0	0	0	0	0	268	0	0	0	0
	Total	197972	27349	3163	3259	0	1852	0	0	0	28215	17987	123	0	2454

Abbreviations: Sewage Treatment Plants, STP's; Combined Sewer Overflows, CSO's

Appendix 4

Table 1. Classification of Shellfish Waters and Sources of Contamination by Subarea within Estuaries-1985 Draft 11/87

Estuary	Subarea	Classification				Primary Pollution Sources for Harvest Limited Classification (acres)									
			Harvest Limited			Non-Point						Point			
		Approved	Harvest Prohibited	Limited Conditional	Restricted	Boating Shipping	Waste Spills	Urban Runoff	Agriculture Feedlots	Wildlife Forestry	Septics	STP's	Straight Pipes	CSO's Sewer Tie-Ins	Industry
Muscongus Bay	Port Clyde	0	324	0	0	0	0	0	0	0	324	0	0	0	0
	Bird Cove (Point)	0	92	0	0	0	0	0	0	0	92	0	0	0	0
	Lawrey	0	15	0	0	0	0	0	0	0	15	0	0	0	0
	Muscongus/ Open Area	41940	0	0	0	0	0	0	0	0	0	0	0	0	0
	Round Pond	0	3	99	0	0	0	0	0	0	102	0	0	0	0
	Waldoboro	0	71	432	71	0	0	0	0	0	0	574	0	0	0
	Hatchet Cove	0	716	0	0	0	0	0	0	0	716	0	0	0	0
	St. George River	0	248	1568	504	0	0	0	0	0	0	2320	0	0	0
	Pleasant Point	0	38	0	0	0	0	0	0	0	38	0	0	0	0
	Meadowmac	0	18	0	0	0	0	0	0	0	0	0	0	0	0
	Total	41940	1525	2099	575	0	0	0	0	0	1287	2894	0	0	0
Sheepscot Bay	Sheepscot Bay/ Open Area	35962	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rutherford Island	0	820	107	0	0	0	0	0	0	727	0	0	0	0
	Kennebec River	0	13326	0	1933	0	0	0	0	0	0	15259	0	0	15259
	Hockamock Bay	0	2740	0	0	0	0	0	0	0	2740	2740	0	0	0
	Georgetown	0	15	0	0	0	15	0	0	0	15	0	0	0	0
	Machmahan Island	0	112	0	0	0	0	0	0	0	112	0	0	0	0
	Back River	0	250	0	0	0	0	0	0	0	0	0	0	0	250
	Wiscasset	0	592	0	0	0	0	0	0	0	592	592	0	0	0
	Five Islands	0	128	0	0	0	0	0	0	0	128	0	0	0	0
	Damariscotta	0	438	0	0	0	0	0	0	0	438	0	0	0	0
	Henoricks	0	28	263	0	0	0	0	0	0	291	0	0	0	0
	Hogdon Cove	0	0	58	0	0	0	0	0	0	58	0	0	0	0
	Booth Bay Harbor	0	4362	48	0	0	0	0	0	0	0	4410	0	0	0
	Little River	0	222	0	0	0	0	0	0	0	222	0	0	0	0
	Pemaquid	0	173	386	0	0	0	0	0	0	559	0	0	0	0
	East Booth Bay	0	110	1448	0	0	0	0	0	0	1558	0	0	0	0
	Total	35962	23116	2310	1933	0	15	0	0	0	7440	23001	0	0	15509

Abbreviations: Sewage Treatment Plants, STP's; Combined Sewer Overflows, CSO's

Appendix 4

Table 1. Classification of Shellfish Waters and Sources of Contamination by Subarea within Estuaries-1985

Draft 11/87

Estuary	Subarea	Classification				Primary Pollution Sources for Harvest Limited Classification (acres)									
			Harvest Limited			Non-Point						Point			
		Approved	Prohibited	Conditional	Restricted	Boating Shipping	Waste Spills	Urban Runoff	Agriculture Feedlots	Wildlife Forestry	Septics	STP's	Straight Pipes	CSO's Sewer Tie-ins	Industry
Casco Bay	Harpswell Harbor	0	18	0	0	0	0	0	0	0	18	0	0	0	0
	South Harpswell	0	293	0	0	0	0	0	0	0	293	0	0	0	0
	Cundys Harbor	0	105	0	0	0	0	0	0	0	105	0	0	0	0
	Seabasco Harbor	0	102	0	0	0	0	0	0	0	102	0	0	0	0
	Orrs Island	0	1558	0	0	0	0	0	0	0	1558	0	0	0	0
	Card Cove	0	314	0	0	0	0	0	0	0	314	0	0	0	0
	Gurnet	0	66	194	0	0	0	0	0	0	260	0	0	0	0
	Middle Ground	0	0	201	0	0	0	0	0	0	201	0	0	0	0
	Sabine	0	64	0	0	0	0	0	0	0	64	0	0	0	0
	Winneganna	0	280	0	0	0	0	0	0	0	280	0	0	0	0
	Wildwood Park	0	0	0	89	0	0	0	0	0	0	89	0	0	0
	Prince Point	0	14	0	0	0	0	0	0	0	14	0	0	0	0
	Chandler Cove	0	143	0	0	0	0	0	0	0	0	143	0	0	0
	West Point	0	31	0	0	0	0	0	0	0	31	0	0	0	0
	Casco Bay/ Open Areas	91892	0	0	0	0	0	0	0	0	0	0	0	0	0
	Harrascket River	0	0	1090	38	0	0	0	0	0	0	1128	0	0	0
	Bunganuc	0	0	0	158	0	158	0	0	0	0	0	0	0	0
	Portland	0	8912	0	533	9445	9445	0	0	0	0	0	0	0	0
	Falmouth Foreside	0	0	339	73	0	0	0	0	0	0	412	0	0	0
	Cousins River	0	0	0	107	0	0	0	0	0	107	107	0	0	0
	Royal River	0	304	0	0	0	0	0	0	0	0	304	0	0	0
	Mere Point Neck	0	31	449	0	0	0	0	0	0	480	0	0	0	0
	Harpswell Neck	0	51	0	0	0	51	0	0	0	0	0	0	0	0
	Total	91892	12286	2273	998	9445	9654	0	0	0	3827	2189	0	0	0
Saco Bay	Goosefare Brook	0	481	0	0	0	0	0	0	0	0	481	0	0	0
	Saco River	0	1073	0	585	0	0	0	0	0	0	1658	0	0	0
	Saco Bay / Open Areas	9849	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nonesuch River	0	27	0	794	0	0	0	0	0	0	0	0	0	821
	Total	9849	1581	0	1379	0	0	0	0	0	0	2139	0	0	821

Abbreviations: Sewage Treatment Plants, STP's; Combined Sewer Overflows, CSO's

Appendix 4

Table 1. Classification of Shellfish Waters and Sources of Contamination by Subarea within Estuaries-1985

Draft 11/87

Estuary	Subarea	Classification				Primary Pollution Sources for Harvest Limited Classification (acres)									
			Harvest Limited			Non-Point						Point			
		Approved	Harvest Prohibited	Limited Conditional	Restricted	Boating Shipping	Waste Spills	Urban Runoff	Agriculture Feedlots	Wildlife Forestry	Septics	STP's	Straight Pipes	CSO's Sewer Tie-ins	Industry
Great Bay	Portsmouth	199	1365	0	219	0	0	0	0	0	0	1584	0	0	0
	Salmon River/ Portsmouth Bay	0	993	0	0	0	0	0	0	0	993	993	0	0	0
	Spruce Creek	0	66	0	221	0	0	0	0	0	287	287	0	0	0
	Spinney Creek	0	0	0	108	0	0	0	0	0	108	0	0	0	0
	Piscataqua	266	1520	0	0	0	0	0	0	0	0	760	760	0	0
	Great Bay	3134	955	0	0	0	0	955	0	0	0	955	0	0	0
	Squamscott & Lamprey	0	475	0	0	0	0	0	0	0	0	475	0	0	0
	Piscataqua River	0	3297	0	0	0	0	0	3297	3297	0	3297	0	0	0
	Total	3599	8671	0	329	0	0	955	3297	3297	1388	8351	760	0	0
Merrimack River	Merrimack River	0	2243	0	0	0	0	2243	0	0	0	2243	0	0	2243
	Plum Island River	0	0	0	216	216	0	216	0	216	216	0	0	0	216
	Total	0	2243	0	216	216	0	2459	0	216	216	2243	0	0	2459
Boston Bay	Nahant Harbor	0	43	0	0	0	0	0	0	0	0	43	0	0	0
	Boston Bay	0	212	0	0	0	0	212	0	0	0	212	0	0	212
	Pines River	0	0	0	110	0	0	0	0	0	0	0	0	0	110
	Broad Sound	0	6132	0	0	6132	0	6132	0	0	0	6132	0	0	0
	Orient Heights	0	476	0	0	0	476	476	0	0	0	476	0	476	0
	Governors Island	0	0	0	327	327	0	327	0	0	0	327	0	0	327
	Winthrop	0	34	0	70	70	0	104	0	0	0	104	0	0	104
	Snake Island	0	0	0	100	100	0	100	0	0	0	100	0	0	100
	Deer Island	0	39	0	0	0	0	39	0	0	0	39	0	0	39
	E/S Boston	0	2393	0	149	0	0	2542	0	0	0	2542	0	0	2542
	Old Harbor	0	215	0	23	238	0	238	0	0	0	238	0	0	238
	Nesponset River	0	358	0	0	358	0	358	0	0	0	358	0	0	358
	Point Shirley	0	0	0	67	67	0	67	0	0	0	67	0	0	67
	Dorchester Yacht Club	0	56	0	0	56	0	56	0	0	0	56	0	0	56
	Dorchester Bay	0	0	0	87	0	0	87	0	0	0	87	0	0	87
	Squaw/Chapel Rocks	0	46	0	0	0	0	46	0	0	0	46	0	0	46
	Quincy Bay	0	135	0	0	0	0	135	0	0	0	135	0	0	135
	Squantum Bay	0	0	0	281	0	0	281	0	0	0	281	0	0	281
	Fox Point	0	61	0	0	61	0	61	0	0	0	61	0	0	61
	Surfside	0	0	0	130	0	0	130	0	0	0	130	0	0	130
	Quincy Bay Marsh	0	0	0	43	0	0	43	0	0	0	43	0	0	43
	Quincy	0	0	0	318	318	0	318	0	0	0	318	0	0	318
	Hole Point Reach	0	0	0	196	196	0	196	0	0	0	196	0	0	196
	Rock Island Cove	0	0	0	243	0	0	243	0	0	0	243	0	0	243
	Nut Island	0	33	0	0	0	0	33	0	0	0	33	0	0	33
	Weymouth	0	33	0	182	0	0	215	0	0	0	215	0	0	215

Abbreviations: Sewage Treatment Plants, STP's; Combined Sewer Overflows, CSO's

Appendix 4

Table 1. Classification of Shellfish Waters and Sources of Contamination by Subarea within Estuaries-1985

Draft 11/87

Estuary	Subarea	Classification				Primary Pollution Sources for Harvest Limited Classification (acres)									
			Harvest Limited			Non-Point						Point			
		Approved	Prohibited	Conditional	Restricted	Boating Shipping	Waste Spills	Urban Runoff	Agriculture Feedlots	Wildlife Forestry	Septics	STP's	Straight Pipes	CSO's Sewer Tie-ins	Industry
Boston Bay (continued)	Quincy Point	0	150	0	0	150	0	150	0	0	0	150	0	0	150
	Weymouth Great Hill	0	0	0	106	106	0	106	0	0	0	106	0	0	106
	Kings Cove	0	28	0	0	28	0	28	0	0	0	28	0	0	28
	Hull	0	0	0	25	0	0	25	0	0	25	25	0	0	25
	Sea Cove	0	0	0	285	0	0	285	0	0	0	285	0	0	285
	Stodders Neck	0	30	0	0	30	0	0	0	0	0	0	0	0	0
	Weymouth River	0	0	0	68	0	0	68	0	0	0	0	0	0	0
	East Weymouth	0	20	0	0	0	0	0	0	0	0	0	0	0	0
	Nantasket Roads	0	570	0	0	570	0	0	0	0	0	0	0	0	0
	Hingham Bay	0	0	0	130	0	0	130	0	0	0	0	130	0	0
	South Channel	0	289	0	0	0	0	0	0	0	0	0	289	0	0
	Hingham Harbor	0	0	0	472	472	0	0	0	0	0	0	0	0	0
	Weir River	0	82	0	0	0	0	0	0	0	0	0	0	0	0
	Planters Hill	0	0	0	148	148	0	0	0	0	0	0	0	0	0
	White Head Flats	0	0	0	185	185	0	0	0	0	0	0	0	0	0
	Allerton	0	98	0	0	0	0	98	0	0	0	0	0	0	0
	Total	0	11533	0	3745	9612	476	13329	0	0	25	13076	419	476	6535
Cape Cod Bay	Green Harbor	0	45	0	0	45	0	0	0	0	0	0	0	45	45
	Back River	1400	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ichabods Flats	6430	0	0	0	0	0	0	0	0	0	0	0	0	0
	Kingston Bay	0	685	0	0	0	0	0	685	685	685	0	685	0	0
	Duxbury	0	13	0	0	0	0	0	0	13	0	0	0	0	0
	Cordage	0	58	0	0	0	0	58	0	0	0	0	0	58	0
	Plymouth Harbor	0	1964	0	0	1964	0	0	0	1964	0	0	0	0	0
	Plymouth Bay	8752	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cape Cod Bay	1061	0	0	0	0	0	0	0	0	0	0	0	0	0
	Stoneybrook Creek	0	6	0	0	0	0	0	6	6	0	0	0	6	0
	Cape Cod Canal	354	373	0	0	299	0	0	0	0	0	299	0	0	0
	Scorton Harbor	0	0	43	0	0	0	0	43	43	0	0	0	0	0
	Sandwich Harbor	0	32	0	0	0	0	0	0	0	32	0	0	0	0
	Provincetown Harbor	10648	61	170	0	0	0	0	0	0	231	0	0	0	0
	Provincetown Marsh	887	45	0	0	0	0	0	0	45	0	0	0	0	0
	Pamet Harbor	263	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hatches Harbor	154	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wellfleet Harbor	5973	53	0	0	0	0	0	0	0	53	0	53	0	0
	Quivett Neck Harbor	429	0	0	0	0	0	0	0	0	0	0	0	0	0
	Barnstable Harbor	9506	41	0	0	41	0	0	0	0	0	41	0	0	41
	Total	45857	3376	213	0	2349	0	58	734	2756	1001	340	738	109	86

Abbreviations: Sewage Treatment Plants, STP's; Combined Sewer Overflows, CSO's

Appendix 4

Table 1. Classification of Shellfish Waters and Sources of Contamination by Subarea within Estuaries-1985

Draft 11/87

Estuary	Subarea	Classification				Primary Pollution Sources for Harvest Limited Classification (acres)									
			Harvest Limited			Non-Point						Point			
		Approved	Prohibited	Conditional	Restricted	Boating Shipping	Waste Spills	Urban Runoff	Agriculture Feedlots	Wildlife Forestry	Septics	STP's	Straight Pipes	CSO's Sewer Tie-Ins	Industry
Buzzards Bay	Gosnold Pond	51	0	0	0	0	0	0	0	0	0	0	0	0	0
	Harbor	760	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nashawena	87	0	0	0	0	0	0	0	0	0	0	0	0	0
	Buzzards Bay	87966	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nashawena Island	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cuttyhunk Pond	24	33	71	0	104	0	0	0	0	0	0	0	104	0
	Salters/Misham Points	0	707	0	0	0	0	0	0	0	0	707	0	0	0
	New Bedford	0	7661	0	0	0	0	0	0	0	0	7661	0	0	7661
	South Dartmouth	0	33	0	0	0	0	0	0	0	0	0	0	33	0
	Nasketucket Bay	3800	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mattapoisett Harbor	1806	98	0	0	98	0	0	0	0	0	0	0	0	0
	Hiller Cove	0	18	0	0	0	0	0	0	18	18	0	0	0	0
	Sippican Harbor	3379	0	166	0	166	0	0	0	0	0	0	0	0	0
	Hammett Cove	0	10	0	0	0	0	0	0	0	10	0	0	0	0
	Wareham	7036	0	0	0	0	0	0	0	0	0	0	0	0	0
	Megansett Harbor	8415	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red Brook Harbor	0	0	36	0	36	0	0	0	0	0	0	0	0	0
	Back River	0	74	0	0	74	0	0	0	74	0	0	0	0	74
	Buttermilk Bay	0	533	0	0	0	0	0	533	533	533	0	0	533	533
	Quissett Harbor	79	0	36	0	36	0	0	0	0	36	0	0	0	0
	Great Harbor	29	83	0	0	83	0	0	0	0	83	83	0	0	0
	Eel Pond	0	17	0	0	17	0	0	0	0	17	0	0	0	0
	Gooseberry/ Slocum Neck	4298	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	117730	9267	309	0	614	0	0	533	625	697	8451	0	670	8268

Abbreviations: Sewage Treatment Plants, STP's; Combined Sewer Overflows, CSO's

Appendix 5

Table 1. Toxic Pollutant Point Source Discharges to Passamaquoddy Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use Wool finishing Knit fabric finishing Woven fabric finishing Stock and yarn General Textile Mfg. Carpet finishing Felted fabrics Non-woven Mfg. Wool scouring															
Timber Products	Plywood Sawmills	0	1	2.66E+09	1	1	5	7	0	0	1	1	2	9	1	0
Pulp and Paper		1	0	1.39E+10	11	1	0	12	0	0	2	1	3	11	0	0
Printing and Publishing																
Chemical Products	Inorganic Chemicals Organic Chemicals Pharmaceuticals Soaps and Detergents Pesticides Adhesives & Sealants															
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing																
Glass Manufacturing																
Iron and Steel																
Foundries -non-ferrous																
Non-ferrous Metals	Primary Non-ferrous Secondary Non-ferrous Copper forming Aluminum forming Non-ferrous forming															
Primary metal products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 1 continued. Toxic Pollutant Point Source Discharges to Passamaquoddy Bay - circa 1982 (1) DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans															
	Hardware, plumbing															
	Structural															
	Screw machine products															
	Metal forgings & stampings															
	Plating & polishing															
	Coil coating															
	Ordnance															
	Miscellaneous															
Machinery	Machinery, general															
Electric & Electronic	Power transformers															
	Distributing & Industrial															
	Lighting & Wiring															
	Electronic Components															
	Miscellaneous															
Transportation	Motor vehicles, aircraft															
	Shipbuilding & repairing															
	Railroad, miscellaneous															
Misc. Manufacturing	Instruments															
	Jewelry, Silver, Musical															
	Toys, Costume jewelry															
TOTAL INDUSTRY		1	1	1.66E+10	12	2	5	19	0	0	3	2	5	20	1	0
Steam Electric																
Petroleum bulk stations																
Sewerage systems	Publicly -owned	0	6	4.52E+08	0	0	2	2	0	0	0	0	0	1	37	0
	Privately-owned															
CSO's		0	2	3.15E+09	3	1	138	142	0	0	1	6	7	18	182	2
Upstream Source																
TOTAL ALL SOURCES EXCEPT UPSTREAM		1	9	2.02E+10	15	3	145	163	0	0	4	8	12	39	220	2

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Appendix 5

Table 2. Toxic Pollutant Point Source Discharges to Englishman Bay - circa 1982 (1)

DRAFT 11/87

Industrial Categoey	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use Wool finishing Knit fabric finishing Woven fabric finishing Stock and yarn General Textile Mfg. Carpet finishing Felted fabrics Non-woven Mfg. Wool scouring	0	1	2.18E+05	0	0	0	0	0	0	0	0	0	0	0	0
Timber Products	Plywood															
Pulp and Paper																
Printing and Publishing																
Chemical Products	Inorganic Chemicals Organic Chemicals Pharmaceuticals Soaps and Detergents Pesticides Adhesives & Sealants															
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing																
Glass Manufacturing																
Iron and Steel																
Foundries -non-ferrous																
Non-ferrous Metals	Primary Non-ferrous Secondary Non-ferrous Copper forming Aluminum forming Non-ferrous forming															
Primary metal products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 2 continued. Toxic Pollutant Point Source Discharges to Englishman Bay - circa 1982 (1)

DRAFT 11/87

Industrial Categoey	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans															
	Hardware, plumbing															
	Structural															
	Screw machine products															
	Metal forgings & stampings															
	Plating & polishing															
	Coil coating															
	Ordnance															
	Miscellaneous															
Machinery	Machinery, general															
Electric & Electronic	Power transformers															
	Distributing & Industrial															
	Lighting & Wiring															
	Electronic Components															
	Miscellaneous															
Transportation	Motor vehicles, aircraft															
	Shipbuilding & repairing															
	Railroad, miscellaneous															
Misc. Manufacturing	Instruments															
	Jewelry, Silver, Musical															
	Toys, Costume jewelry															
TOTAL INDUSTRY		0	1	2.18E+05	0	0	0	0	0	0	0	0	0	0	0	0
Steam Electric		0	1	1.48E+07	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum bulk stations																
Sewerage systems	Publicly -owned	0	1	2.26E+08	0	0	0	0	0	0	0	0	0	1	11	0
	Privately-owned															
CSO's		0	1	1.45E+08	0	0	6	6	0	0	0	0	0	1	8	0
Upstream Source																
TOTAL ALL SOURCES EXCEPT UPSTREAM		0	4	3.86E+08	0	0	6	6	0	0	0	0	0	2	19	0

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Appendix 5

Table 3. Toxic Pollutant Point Source Discharges to Narraguagus Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use														
	Wool finishing														
	Knit fabric finishing														
	Woven fabric finishing														
	Stock and yarn														
	General Textile Mfg.														
	Carpet finishing														
	Felted fabrics														
	Non-woven Mfg.														
	Wool scouring														
Timber Products	Plywood														
Pulp and Paper															
Printing and Publishing															
Chemical Products	Inorganic Chemicals														
	Organic Chemicals														
	Pharmaceuticals														
	Soaps and Detergents														
	Pesticides														
	Adhesives & Sealants														
Petroleum Refining															
Tire and Inner Tube															
Rubber Processing															
Glass Manufacturing															
Iron and Steel															
Foundries -non-ferrous															
Non-ferrous Metals	Primary Non-ferrous														
	Secondary Non-ferrous														
	Copper forming														
	Aluminum forming														
	Non-ferrous forming														
Primary metal products															

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 3 continued. Toxic Pollutant Point Source Discharges to Narraguagus Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans														
	Hardware, plumbing														
	Structural														
	Screw machine products														
	Metal forgings & stampings														
	Plating & polishing														
	Coil coating														
	Ordnance														
	Miscellaneous														
Machinery	Machinery, general														
Electric & Electronic	Power transformers														
	Distributing & Industrial														
	Lighting & Wiring														
	Electronic Components														
	Miscellaneous														
Transportation	Motor vehicles, aircraft														
	Shipbuilding & repairing														
	Railroad, miscellaneous														
Misc. Manufacturing	Instruments														
	Jewelry, Silver, Musical														
	Toys, Costume jewelry														
TOTAL INDUSTRY															
Steam Electric															
Petroleum bulk stations															
Sewerage systems	Publicly -owned														
	Privately-owned	0	1	2.41E+06	0	0	0	0	0	0	0	0	0	0	0
CSOs															
Upstream Source															
TOTAL ALL SOURCES EXCEPT UPSTREAM		0	1	2.41E+06	0	0	0	0	0	0	0	0	0	0	0

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Appendix 5

Table 4. Toxic Pollutant Point Source Discharges to Blue Hill Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use															
	Wool finishing															
	Knit fabric finishing															
	Woven fabric finishing															
	Stock and yarn															
	General Textile Mfg.															
	Carpet finishing															
	Felted fabrics															
	Non-woven Mfg.															
	Wool scouring															
Timber Products	Plywood															
Pulp and Paper																
Printing and Publishing																
Chemical Products	Inorganic Chemicals															
	Organic Chemicals															
	Pharmaceuticals															
	Soaps and Detergents															
	Pesticides															
	Adhesives & Sealants															
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing																
Glass Manufacturing																
Iron and Steel																
Foundries -non-ferrous																
Non-ferrous Metals	Primary Non-ferrous															
	Secondary Non-ferrous															
	Copper forming															
	Aluminum forming															
	Non-ferrous forming															
Primary metal products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Appendix 5

Table 4. Toxic Pollutant Point Source Discharges to Blue Hill Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans															
	Hardware, plumbing															
	Structural															
	Screw machine products															
	Metal forgings & stampings															
	Plating & polishing															
	Coil coating															
	Ordnance															
	Miscellaneous															
Machinery	Machinery, general															
Electric & Electronic	Power transformers															
	Distributing & Industrial															
	Lighting & Wiring															
	Electronic Components															
	Miscellaneous															
Transportation	Motor vehicles, aircraft															
	Shipbuilding & repairing															
	Railroad, miscellaneous															
Misc. Manufacturing	Instruments															
	Jewelry, Silver, Musical															
	Toys, Costume jewelry															
TOTAL INDUSTRY																
Steam Electric																
Petroleum bulk stations																
Sewerage systems	Publicly -owned	0	2	1.68E+08	0	0	0	0	0	0	0	0	0	0	8	0
	Privately-owned															
CSOs																
Upstream Source																
TOTAL ALL SOURCES EXCEPT UPSTREAM		0	2	1.68E+08	0	0	0	0	0	0	0	0	0	0	8	0

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Appendix 5

Table 5. Toxic Pollutant Point Source Discharges to Penobscot Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use Wool finishing Knit fabric finishing Woven fabric finishing Stock and yarn General Textile Mfg. Carpet finishing Felted fabrics Non-woven Mfg. Wool scouring															
Timber Products	Plywood															
Pulp and Paper		1	0	1.10E+10	9	0	0	9	0	0	1	0	1	9	0	0
Printing and Publishing																
Chemical Products	Inorganic Chemicals	1	1	7.16E+08	0	0	1	1	0	0	0	0	0	2	0	0
	Organic Chemicals Pharmaceuticals Soaps and Detergents Pesticides Adhesives & Sealants	1	0	1.78E+09	1	0	3	4	0	0	0	0	0	6	0	0
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing																
Glass Manufacturing																
Iron and Steel																
Foundries -non-ferrous																
Non-ferrous Metals	Primary Non-ferrous Secondary Non-ferrous Copper forming Aluminum forming Non-ferrous forming															
Primary metal products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 5 continued. Toxic Pollutant Point Source Discharges to Penobscot Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans															
	Hardware, plumbing															
	Structural															
	Screw machine products															
	Metal forgings & stampings															
	Plating & polishing															
	Coil coating															
	Ordnance															
	Miscellaneous															
Machinery	Machinery, general															
Electric & Electronic	Power transformers															
	Distributing & Industrial															
	Lighting & Wiring															
	Electronic Components															
	Miscellaneous															
Transportation	Motor vehicles, aircraft															
	Shipbuilding & repairing															
	Railroad, miscellaneous															
Misc. Manufacturing	Instruments															
	Jewelry, Silver, Musical															
	Toys, Costume jewelry															
TOTAL INDUSTRY		3	1	1.35E+10	10	0	4	14	0	0	1	0	1	17	0	0
Steam Electric																
Petroleum bulk stations		0	10	3.16E+07	0	0	0	0	0	0	0	0	0	0	0	0
Sewerage systems	Publicly -owned	1	8	1.55E+09	1	0	7	8	0	0	0	0	0	5	151	2
	Privately-owned	0	2	2.26E+08	0	0	1	1	0	0	0	0	0	1	14	1
CSO's		0	3	7.02E+08	1	0	31	32	0	0	0	1	1	4	41	0
Upstream Source				1.69E+12	210	41	1490	1741	12	9	91	32	144	3720	0	0
TOTAL ALL SOURCES EXCEPT UPSTREAM		4	24	1.60E+10	12	0	43	55	0	0	1	1	2	27	206	3

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Appendix 5

Table 6. Toxic Pollutant Point Source Discharges to Muscongus Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use Wool finishing Knit fabric finishing Woven fabric finishing Stock and yarn General Textile Mfg. Carpet finishing Felted fabrics Non-woven Mfg. Wool scouring															
Timber Products	Plywood															
Pulp and Paper																
Printing and Publishing																
Chemical Products	Inorganic Chemicals Organic Chemicals Pharmaceuticals Soaps and Detergents Pesticides Adhesives & Sealants	0	2	6.83E+07	0	0	0	0	0	0	0	0	0	1	0	0
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing																
Glass Manufacturing																
Iron and Steel																
Foundries -non-ferrous																
Non-ferrous Metals	Primary Non-ferrous Secondary Non-ferrous Copper forming Aluminum forming Non-ferrous forming															
Primary metal products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 6 continued. Toxic Pollutant Point Source Discharges to Muscongus Bay - circa 1982 (1) DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans															
	Hardware, plumbing															
	Structural															
	Screw machine products															
	Metal forgings & stampings															
	Plating & polishing															
	Coil coating															
	Ordnance															
	Miscellaneous															
Machinery	Machinery, general															
Electric & Electronic	Power transformers															
	Distributing & Industrial															
	Lighting & Wiring															
	Electronic Components	0	1	1.44E+07	0	0	0	0	0	0	0	0	0	0	0	0
	Miscellaneous															
Transportation	Motor vehicles, aircraft															
	Shipbuilding & repairing															
	Railroad, miscellaneous															
Misc. Manufacturing	Instruments															
	Jewelry, Silver, Musical															
	Toys, Costume jewelry															
TOTAL INDUSTRY		0	3	8.27E+07	0	0	0	0	0	0	0	0	0	1	0	0
Steam Electric																
Petroleum bulk stations																
Sewerage systems	Publicly -owned	0	3	3.53E+08	0	0	1	1	0	0	0	0	0	1	25	1
	Privately-owned	0	2	1.89E+07	0	0	0	0	0	0	0	0	0	4	2	7
CSO's		0	1	8.50E+06	0	0	0	0	0	0	0	0	0	0	0	0
Upstream Source																
TOTAL ALL SOURCES EXCEPT UPSTREAM		0	9	4.63E+08	0	0	1	1	0	0	0	0	0	6	27	8

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Appendix 5

Table 7. Toxic Pollutant Point Source Discharges to Sheepscot Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use Wool finishing Knit fabric finishing Woven fabric finishing Stock and yarn General Textile Mfg. Carpet finishing Felted fabrics Non-woven Mfg. Wool scouring															
Timber Products	Plywood		1	1.31E+07	0	0	0	0	0	0	0	0	0	0	1	0
Pulp and Paper		1		1.20E+09	1	0	0	1	0	0	0	0	0	1	0	0
Printing and Publishing																
Chemical Products	Inorganic Chemicals Organic Chemicals Pharmaceuticals Soaps and Detergents Pesticides Adhesives & Sealants															
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing																
Glass Manufacturing																
Iron and Steel																
Foundries -non-ferrous																
Non-ferrous Metals	Primary Non-ferrous Secondary Non-ferrous Copper forming Aluminum forming Non-ferrous forming															
Primary metal products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Appendix 5

Table 7. Toxic Pollutant Point Source Discharges to Sheepscot Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans Hardware, plumbing Structural Screw machine products Metal forgings & stampings Plating & polishing Coil coating Ordnance Miscellaneous															
Machinery	Machinery, general															
Electric & Electronic	Power transformers Distributing & Industrial Lighting & Wiring Electronic Components Miscellaneous															
Transportation	Motor vehicles, aircraft Shipbuilding & repairing Railroad, miscellaneous	0	1	6.03E+07	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Manufacturing	Instruments Jewelry, Silver, Musical Toys, Costume jewelry															
TOTAL INDUSTRY		1	2	1.27E+09	1	0	0	1	0	0	0	0	0	1	1	0
Steam Electric		1	1	6.59E+09	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum bulk stations																
Sewerage systems	Publicly -owned	1	4	8.65E+08	1	0	5	6	0	0	0	0	0	3	98	0
	Privately-owned		2	2.15E+06	0	0	0	0	0	0	0	0	0	0	0	0
CSOs		0	3	1.17E+09	1	0	52	53	0	0	0	2	2	7	68	1
Upstream Source				1.82E+12	164	121	1930	2215	9	9	114	87	219	3560	0	0
TOTAL ALL SOURCES EXCEPT UPSTREAM		3	12	9.9E+09	3	0	57	60	0	0	0	2	2	11	167	1

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Appendix 5

Table 8. Toxic Pollutant Point Source Discharges to Casco Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use Wool finishing Knit fabric finishing Woven fabric finishing Stock and yarn General Textile Mfg. Carpet finishing Felted fabrics Non-woven Mfg. Wool scouring															
Timber Products	Plywood															
Pulp and Paper		1	0	1.06E+10	8	1	4	13	0	0	1	1	2	13	0	0
Printing and Publishing																
Chemical Products	Inorganic Chemicals Organic Chemicals Pharmaceuticals Soaps and Detergents Pesticides Adhesives & Sealants															
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing		0	1	5.93E+06	0	0	0	0	0	0	0	0	0	0	0	0
Glass Manufacturing																
Iron and Steel																
Foundries -non-ferrous																
Non-ferrous Metals	Primary Non-ferrous Secondary Non-ferrous Copper forming Aluminum forming Non-ferrous forming															
Primary metal products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 8 continued. Toxic Pollutant Point Source Discharges to Casco Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans Hardware, plumbing Structural Screw machine products Metal forgings & stampings Plating & polishing Coil coating Ordnance Miscellaneous	0	1	6.38E+06	0	0	0	0	0	0	0	0	0	0	0	0
Machinery	Machinery, general	0	2	6.30E+07	0	0	0	0	0	0	0	0	0	0	0	0
Electric & Electronic	Power transformers Distributing & Industrial Lighting & Wiring Electronic Components Miscellaneous	0	1	1.63E+07	0	0	0	0	0	0	0	0	0	0	0	0
Transportation	Motor vehicles, aircraft Shipbuilding & repairing Railroad, miscellaneous	0	1	5.43E+07	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Manufacturing	Instruments Jewelry, Silver, Musical Toys, Costume Jewelry															
TOTAL INDUSTRY		1	6	1.07E+10	8	1	4	13	0	0	1	1	2	13	0	0
Steam Electric		1	2	1.60E+11	0	1	0	1	0	0	0	0	0	0	0	0
Petroleum bulk stations		0	14	4.41E+07	0	0	0	0	0	0	0	0	0	0	0	0
Sewerage systems	Publicly -owned	2	13	7.97E+09	5	2	37	44	0	0	2	2	4	26	748	12
	Privately-owned	0	2	4.64E+07	0	0	0	0	0	0	0	0	0	0	5	0
CSOs		1	2	3.10E+09	3	1	136	140	1	0	1	6	8	17	179	2
Upstream Source																
TOTAL ALL SOURCES EXCEPT UPSTREAM		5	39	1.82E+11	16	5	177	198	1	0	4	9	14	56	932	14

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Appendix 5

Table 9. Toxic Pollutant Point Source Discharges to Saco Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use Wool finishing Knit fabric finishing Woven fabric finishing Stock and yarn General Textile Mfg. Carpet finishing Felted fabrics Non-woven Mfg. Wool scouring	0	1	2.40E+07	0	0	0	0	0	0	0	0	0	0	0	0
Timber Products	Plywood															
Pulp and Paper																
Printing and Publishing																
Chemical Products	Inorganic Chemicals Organic Chemicals Pharmaceuticals Soaps and Detergents Pesticides Adhesives & Sealants															
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing		0	1	1.25E+07	0	0	0	0	0	0	0	0	0	0	0	0
Glass Manufacturing																
Iron and Steel																
Foundries -non-ferrous																
Non-ferrous Metals	Primary Non-ferrous Secondary Non-ferrous Copper forming Aluminum forming Non-ferrous forming															
Primary metal products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 9 continued. Toxic Pollutant Point Source Discharges to Saco Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans															
	Hardware, plumbing															
	Structural															
	Screw machine products	0	1	2.24E+06	0	0	0	0	0	0	0	0	0	0	0	0
	Metal forgings & stampings															
	Plating & polishing	0	1	3.52E+06	0	0	0	0	0	0	0	0	0	0	0	0
	Coil coating															
	Ordnance	1	0	1.67E+08	0	1	0	1	0	0	0	0	0	0	8	0
	Miscellaneous															
Machinery	Machinery, general															
Electric & Electronic	Power transformers															
	Distributing & Industrial															
	Lighting & Wiring															
	Electronic Components															
	Miscellaneous															
Transportation	Motor vehicles, aircraft															
	Shipbuilding & repairing															
	Railroad, miscellaneous															
Misc. Manufacturing	Instruments															
	Jewelry, Silver, Musical															
	Toys, Costume jewelry															
TOTAL INDUSTRY		1	4	2.09E+08	0	1	0	1	0	0	0	0	0	0	8	0
Steam Electric																
Petroleum bulk stations																
Sewerage systems	Publicly -owned	2	3	2.09E+09	1	0	10	11	0	0	0	0	0	7	203	0
	Privately-owned	0	5	5.99E+08	0	0	2	2	0	0	0	0	0	2	45	2
CSOs		0	1	8.50E+08	1	0	37	38	0	0	0	2	2	5	49	0
Upstream Source				6.17E+11	43	23	1500	1566	3	4	40	23	70	644	0	0
TOTAL ALL SOURCES EXCEPT UPSTREAM		3	13	3.75E+09	2	1	49	52	0	0	0	2	2	14	305	2

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Appendix 5

Table 10. Toxic Pollutant Point Source Discharges to Great Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use Wool finishing Knit fabric finishing Woven fabric finishing Stock and yarn General Textile Mfg. Carpet finishing Felted fabrics Non-woven Mfg. Wool scouring	1		7.67E+07	1	0	0	1	0	0	0	0	0	0	0	0
Timber Products	Plywood															
Pulp and Paper			2	2.46E+08	0	0	0	0	0	0	0	0	0	0	0	0
Printing and Publishing																
Chemical Products	Inorganic Chemicals Organic Chemicals Pharmaceuticals Soaps and Detergents Pesticides Adhesives & Sealants															
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing			1	6.27E+06	0	0	0	0	0	0	0	0	0	0	0	0
Glass Manufacturing																
Iron and Steel																
Foundries -non-ferrous																
Non-ferrous Metals	Primary Non-ferrous Secondary Non-ferrous Copper forming Aluminum forming Non-ferrous forming															
Primary metal products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 10 continued. Toxic Pollutant Point Source Discharges to Great Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans															
	Hardware, plumbing															
	Structural															
	Screw machine products															
	Metal forgings & stampings															
	Plating & polishing															
	Coil coating															
	Ordnance															
	Miscellaneous															
Machinery	Machinery, general															
Electric & Electronic	Power transformers	1	0	2.99E+08	0	0	1	1	0	0	0	0	0	1	0	0
	Distributing & Industrial Lighting & Wiring		1	7.67E+07	0	0	0	0	0	0	0	0	0	0	0	0
	Electronic Components	1		1.11E+07	0	0	0	0	0	0	0	0	0	0	0	0
	Miscellaneous															
Transportation	Motor vehicles, aircraft	1	0	1.79E+08	0	0	1	1	0	0	0	0	0	1	2	0
	Shipbuilding & repairing	1		1.76E+09	2	1	20	23	0	0	1	1	2	21	12	0
	Railroad, miscellaneous															
Misc. Manufacturing	Instruments															
	Jewelry, Silver, Musical															
	Toys, Costume jewelry															
TOTAL INDUSTRY		5	4	2.65E+09	3	1	22	26	0	0	1	1	2	23	14	0
Steam Electric		1	2	2.79E+11	0	2	0	2	0	0	0	0	0	0	0	0
Petroleum bulk stations																
Sewerage systems	Publicly -owned	5	13	5.14E+09	3	1	26	30	0	0	1	1	2	17	533	2
	Privately-owned		1	7.03E+08	0	0	0	0	0	0	0	0	0	0	1	0
CSOs		3	3	2.21E+09	2	1	97	100	0	0	1	4	5	12	127	1
Upstream Source																
TOTAL ALL SOURCES EXCEPT UPSTREAM		14	23	2.90E+11	8	5	145	158	0	0	3	6	9	52	675	3

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 11. Toxic Pollutant Point Source Discharges to Merrimack River - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use															
	Wool finishing															
	Knit fabric finishing		1	4.60E+06	0	0	0	0	0	0	0	0	0	0	0	0
	Woven fabric finishing															
	Stock and yarn															
	General Textile Mfg.															
	Carpet finishing															
	Felted fabrics															
	Non-woven Mfg.															
	Wool scouring	1		4.34E+07	0	0	0	0	0	0	0	0	0	0	34	0
Timber Products	Plywood															
Pulp and Paper		1	1	2.42E+09	2	0	0	2	0	0	0	0	0	2	0	0
Printing and Publishing			1	8.53E+06	0	0	0	0	0	0	0	0	0	0	0	0
Chemical Products	Inorganic Chemicals															
	Organic Chemicals		2	1.06E+08	0	0	0	0	0	0	0	0	0	2	3	0
	Pharmaceuticals															
	Soaps and Detergents															
	Pesticides															
	Adhesives & Sealants		1	2.11E+06	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing		1	4	4.06E+08	0	0	1	1	0	0	0	0	0	1	5	0
Glass Manufacturing																
Iron and Steel																
Foundries -non-ferrous			1	8.24E+08	0	0	2	2	0	0	0	0	0	3	0	0
Non-ferrous Metals	Primary Non-ferrous															
	Secondary Non-ferrous															
	Copper forming															
	Aluminum forming															
	Non-ferrous forming		1	1.11E+08	0	0	0	0	0	0	0	0	0	0	2	0
Primary Metal Products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 11 continued. Toxic Pollutant Point Source Discharges to Merrimack River - circa 1982 (1) DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans															
	Hardware, plumbing	0	1	1.32E+06	0	0	0	0	0	0	0	0	0	0	0	0
	Structural															
	Screw machine products															
	Metal forgings & stampings															
	Plating & polishing		3	1.16E+07	0	0	0	0	0	0	0	0	0	0	0	0
	Coil coating		1	2.02E+06	0	0	0	0	0	0	0	0	0	0	0	0
	Ordnance															
	Miscellaneous															
Machinery	Machinery, general		2	2.30E+07	0	0	0	0	0	0	0	0	0	0	0	0
Electric & Electronic	Telephone & Telegraph	1		2.02E+08	0	1	0	1	0	0	0	0	0	0	8	0
	Power transformers															
	Distributing & Industrial															
	Lighting & Wiring															
	Electronic Components	1	2	1.04E+08	0	0	0	0	0	0	0	0	0	0	2	0
	Miscellaneous															
Transportation	Motor vehicles, aircraft															
	Shipbuilding & repairing															
	Railroad, miscellaneous															
Misc. Manufacturing	Instruments															
	Jewelry, Silver, Musical															
	Toys, Costume jewelry															
TOTAL INDUSTRY		5	21	4.27E+09	2	1	3	6	0	0	0	0	0	8	54	0
Steam Electric																
Petroleum bulk stations																
Sewerage systems	Publicly -owned	5	2	2.79E+10	16	6	151	173	0	0	7	6	13	93	3200	0
	Privately-owned															
CSO's		1	1	4.32E+09	5	2	189	196	0	0	2	9	11	24	249	2
Upstream Source				1.94E+12	207	82	343	3759	12	8	81	29	130	1620	11300	4
TOTAL ALL SOURCES EXCEPT UPSTREAM		11	24	1.98E+12	23	9	343	375	0	0	9	15	24	131	3503	2

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Appendix 5

Table 12. Toxic Pollutant Point Source Discharges to Boston Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use		3	2.06E+08	2	0	0	2	0	0	0	0	0	0	0	0
	Wool finishing															
	Knit fabric finishing															
	Woven fabric finishing															
	Stock and yam															
	General Textile Mfg.															
	Carpet finishing															
	Felted fabrics															
	Non-woven Mfg.		1	7.21E+07	0	0	0	0	0	0	0	0	0	0	0	0
	Wool scouring															
Timber Products	Plywood															
Pulp and Paper			2	8.16E+07	0	0	0	0	0	0	0	0	0	0	0	0
Printing and Publishing			1	3.38E+06	0	0	0	0	0	0	0	0	0	0	0	0
Chemical Products	Inorganic Chemicals		1	1.06E+09	0	0	2	2	0	0	0	0	0	4	0	0
	Organic Chemicals		1	9.28E+08	0	0	2	2	0	0	0	0	0	3	0	0
	Pharmaceuticals															
	Soaps and Detergents		1	3.14E+08	0	0	1	1	0	0	0	0	0	1	0	0
	Pesticides		1	4.77E+07	0	0	0	0	0	0	0	0	0	0	0	9
	Adhesives & Sealants		2	2.61E+07	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing			5	7.34E+08	0	0	1	1	0	0	0	0	0	2	0	0
Glass Manufacturing																
Iron and Steel																
Foundries -non-ferrous																
Non-ferrous Metals	Primary Non-ferrous															
	Secondary Non-ferrous															
	Copper forming															
	Aluminum forming															
	Non-ferrous forming															
Primary metal products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 12 continued. Toxic Pollutant Point Source Discharges to Boston Bay - circa 1982 (1) DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans															
	Hardware, plumbing		2	4.73E+09	2	1	10	13	0	0	1	1	2	16	0	0
	Structural															
	Screw machine products															
	Metal forgings & stampings		2	7.89E+06	0	0	0	0	0	0	0	0	0	0	0	0
	Plating & polishing		1	2.98E+07	0	0	0	0	0	0	0	0	0	0	0	0
	Coil coating															
	Ordnance															
	Miscellaneous															
Machinery	Machinery, general	1	5	2.31E+10	8	5	48	61	0	1	5	5	11	107	41	0
Electric & Electronic	Power transformers															
	Distributing & Industrial															
	Lighting & Wiring		2	1.66E+07	0	0	0	0	0	0	0	0	0	0	0	0
	Electronic Components															
	Miscellaneous															
Transportation	Motor vehicles, aircraft		1	6.86E+07	0	0	0	0	0	0	0	0	0	0	0	0
	Shipbuilding & repairing	1	1	9.76E+08	1	1	13	15	0	0	0	0	0	13	8	0
	Railroad, miscellaneous		1	1.05E+07	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Manufacturing	Instruments		1	6.57E+07	0	0	0	0	0	0	0	0	0	0	0	0
	Jewelry, Silver, Musical															
	Toys, Costume jewelry		1	8.76E+05	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INDUSTRY		2	35	3.25E+10	13	7	77	97	0	1	6	6	13	146	49	9
Steam Electric		2	3	5.21E+11	0	4	0	4	0	0	0	0	0	0	0	0
Petroleum bulk stations																
Sewerage systems	Publicly -owned	2	7	1.83E+11	105	42	1002	1149	2	0	44	38	84	613	21190	1
	Privately-owned															
CSO's		5		2.84E+10	31	12	1250	1293	1	1	12	56	70	160	1640	16
Upstream Source																
TOTAL ALL SOURCES EXCEPT UPSTREAM		11	45	7.65E+11	149	65	2329	2543	3	2	62	100	167	919	22870	26

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

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Table 13. Toxic Pollutant Point Source Discharges to Cape Cod Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use															
	Wool finishing															
	Knit fabric finishing															
	Woven fabric finishing															
	Stock and yarn															
	General Textile Mfg.															
	Carpet finishing															
	Felted fabrics															
	Non-woven Mfg.															
	Wool scouring															
Timber Products	Plywood															
Pulp and Paper																
Printing and Publishing																
Chemical Products	Inorganic Chemicals															
	Organic Chemicals															
	Pharmaceuticals															
	Soaps and Detergents															
	Pesticides															
	Adhesives & Sealants															
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing																
Glass Manufacturing																
Iron and Steel																
Foundries -non-ferrous																
Non-ferrous Metals	Primary Non-ferrous															
	Secondary Non-ferrous															
	Copper forming															
	Aluminum forming															
	Non-ferrous forming															
Primary metal products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 13 continued. Toxic Pollutant Point Source Discharges to Cape Cod Bay - circa 1982 (1) DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans Hardware, plumbing Structural Screw machine products Metal forgings & stampings Plating & polishing Coil coating Ordnance Miscellaneous															
Machinery	Machinery, general															
Electric & Electronic	Power transformers Distributing & Industrial Lighting & Wiring Electronic Components Miscellaneous															
Transportation	Motor vehicles, aircraft Shipbuilding & repairing Railroad, miscellaneous															
Misc. Manufacturing	Instruments Jewelry, Silver, Musical Toys, Costume jewelry															
TOTAL INDUSTRY		0	0	0.00E+00	0	0	0	0	0	0	0	0	0	0	0	0
Steam Electric		2		4.11E+11	0	3	0	3	0	0	0	0	0	0	0	0
Petroleum bulk stations																
Sewerage systems	Publicly -owned Privately-owned	4		1.25E+09	1	0	7	8	0	0	0	0	0	4	144	0
CSOs																
Upstream Source																
TOTAL ALL SOURCES EXCEPT UPSTREAM		4	0	4.12E+11	1	3	7	11	0	0	0	0	0	4	144	0

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

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Table 14. Toxic Pollutant Point Source Discharges to Buzzards Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use Wool finishing Knit fabric finishing Woven fabric finishing Stock and yarn	0	2	9.48E+08	0	0	2	2	0	0	0	0	0	3	0	0
	General Textile Mfg. Carpet finishing Felted fabrics Non-woven Mfg. Wool scouring	0	1	8.73E+06	0	0	0	0	0	0	0	0	0	0	0	0
Timber Products	Plywood															
Pulp and Paper																
Printing and Publishing																
Chemical Products	Inorganic Chemicals Organic Chemicals Pharmaceuticals Soaps and Detergents Pesticides Adhesives & Sealants															
Petroleum Refining																
Tire and Inner Tube		0	1	2.33E+06	0	0	0	0	0	0	0	0	0	0	0	0
Rubber Processing		0	1	2.44E+07	0	0	0	0	0	0	0	0	0	0	2	0
Glass Manufacturing																
Iron and Steel		0	2	1.66E+08	0	0	0	0	0	0	0	0	0	1	0	0
Foundries -non-ferrous																
Non-ferrous Metals	Primary Non-ferrous Secondary Non-ferrous Copper forming Aluminum forming Non-ferrous forming	0	1	1.59E+08	0	0	0	0	0	0	0	0	0	0	4	0
Primary metal products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 14 continued. Toxic Pollutant Point Source Discharges to Buzzards Bay - circa 1982 (1) DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans Hardware, plumbing Structural Screw machine products Metal forgings & stampings Plating & polishing Coil coating Ordnance Miscellaneous	0	1	2.98E+07	0	0	0	0	0	0	0	0	0	0	0	0
Machinery	Machinery, general															
Electric & Electronic	Power transformers Distributing & Industrial Lighting & Wiring Electronic Components Miscellaneous	0	3	1.40E+08	0	0	0	0	0	0	0	0	0	0	2	0
Transportation	Motor vehicles, aircraft Shipbuilding & repairing Railroad, miscellaneous															
Misc. Manufacturing	Instruments Jewelry, Silver, Musical Toys, Costume jewelry	0	2	2.31E+08	0	0	0	0	0	0	0	0	0	1	0	0
TOTAL INDUSTRY		0	14	1.71E+09	0	0	2	2	0	0	0	0	0	5	8	0
Steam Electric		0	1	4.36E+09	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum bulk stations																
Sewerage systems	Publicly -owned Privately-owned	1	2	1.51E+10	9	3	73	85	0	0	4	3	7	50	1740	0
CSO's		1		1.86E+09	2	1	81	84	0	0	1	4	5	7	89	1
Upstream Source																
TOTAL ALL SOURCES EXCEPT UPSTREAM		2	17	2.30E+10	11	4	156	171	0	0	5	7	12	62	1837	1

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

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Table 15. Toxic Pollutant Point Source Discharges to Narragansett Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use															
	Wool finishing															
	Knit fabric finishing		1	2.18E+04	0	0	0	0	0	0	0	0	0	0	0	0
	Woven fabric finishing	2	1	3.42E+08	1	0	0	1	0	0	0	0	0	2	20	0
	Stock and yarn		2	1.56E+08	0	0	0	0	0	0	0	0	0	1	34	0
	General Textile Mfg.		2	1.14E+07	0	0	0	0	0	0	0	0	0	0	1	0
	Carpet finishing															
	Felted fabrics		1	7.89E+06	0	0	0	0	0	0	0	0	0	0	0	0
	Non-woven Mfg.															
	Wool scouring															
Timber Products	Plywood															
Pulp and Paper			2	4.47E+08	0	0	1	1	0	0	0	0	0	1	0	0
Printing and Publishing			1	6.75E+04	0	0	0	0	0	0	0	0	0	0	0	0
Chemical Products	Inorganic Chemicals		2	1.12E+08	0	0	0	0	0	0	0	0	0	0	0	0
	Organic Chemicals	2	4	2.66E+09	2	1	2	5	0	0	6	0	6	56	115	0
	Pharmaceuticals	1	1	3.87E+08	0	0	0	0	0	0	0	0	0	1	0	0
	Soaps and Detergents		1	4.10E+07	0	0	0	0	0	0	0	0	0	0	0	0
	Pesticides															
	Adhesives & Sealants		1	1.23E+05	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing			16	4.64E+08	0	0	1	1	0	0	0	0	0	2	1	0
Glass Manufacturing			1	7.14E+07	0	0	0	0	0	0	0	0	0	0	2	0
Iron and Steel		1	1	2.12E+08	0	0	0	0	0	0	0	0	0	0	0	0
Foundries -non-ferrous			2	1.27E+05	0	0	0	0	0	0	0	0	0	0	0	0
Non-ferrous Metals	Primary Non-ferrous	1		4.49E+06	0	0	0	0	0	0	0	0	0	0	0	0
	Secondary Non-ferrous															
	Copper forming		1	2.17E+07	0	0	0	0	0	0	0	0	0	0	0	0
	Aluminum forming															
	Non-ferrous forming	2	4	2.67E+08	0	0	1	1	0	0	0	0	0	0	7	0
Primary metal products			1	1.75E+07	0	0	0	0	0	0	0	0	0	0	0	0

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Table 15 continued. Toxic Pollutant Point Source Discharges to Narragansett Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans															
	Hardware, plumbing															
	Structural		1	1.10E+07	0	0	0	0	0	0	0	0	0	0	0	0
	Screw machine products															
	Metal forgings & stampings		1	1.50E+06	0	0	0	0	0	0	0	0	0	0	0	0
	Plating & polishing	1	10	1.19E+08	0	0	0	0	0	0	0	0	0	0	5	0
	Coil coating	2	1	1.25E+08	2	0	1	3	0	0	0	0	0	0	6	0
	Ordnance															
	Miscellaneous		1	1.10E+07	0	0	0	0	0	0	0	0	0	0	0	0
Machinery	Machinery, general		5	9.69E+07	0	0	0	0	0	0	0	0	0	10	0	0
Electric & Electronic	Power transformers															
	Distributing & Industrial	1		4.49E+08	0	1	1	2	0	0	1	0	1	1	9	0
	Lighting & Wiring		1	1.10E+06	0	0	0	0	0	0	0	0	0	0	0	0
	Electronic Components	1	4	3.64E+07	0	0	0	0	0	0	0	0	0	0	1	0
	Miscellaneous															
Transportation	Motor vehicles, aircraft															
	Shipbuilding & repairing		1	2.71E+06	0	0	0	0	0	0	0	0	0	0	0	0
	Railroad, miscellaneous															
Misc. Manufacturing	Instruments															
	Jewelry, Silver, Musical	1	5	7.15E+07	0	0	0	0	0	0	0	0	0	1	0	0
	Toys, Costume jewelry	1	5	8.22E+07	0	0	0	0	0	0	0	0	0	1	1	0
TOTAL INDUSTRY		16	80	6.23E+09	5	2	7	14	0	0	7	0	7	66	202	0
Steam Electric		3	4	6.86E+11	0	6	0	6	0	0	0	0	0	0	0	0
Petroleum bulk stations			2	1.01E+08	0	0	0	0	0	0	0	0	0	0	5	0
Sewerage systems	Publicly -owned	12	13	6.02E+10	34	14	327	375	1	0	14	13	28	178	6921	0
	Privately-owned															
CSOs		2		7.67E+09	8	3	336	347	0	0	3	15	18	43	442	4
Upstream Source																
TOTAL ALL SOURCES EXCEPT UPSTREAM		33	99	7.60E+11	47	25	670	742	1	0	24	28	53	287	7570	4

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

Appendix 5

Table 16. Toxic Pollutant Point Source Discharges to Gardiners Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As	Cd	Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Textile Manufacturing	Wool, Low water-use															
	Wool finishing															
	Knit fabric finishing															
	Woven fabric finishing															
	Stock and yarn															
	General Textile Mfg.															
	Carpet finishing															
	Felted fabrics															
	Non-woven Mfg.															
	Wool scouring															
Timber Products	Plywood															
Pulp and Paper																
Printing and Publishing																
Chemical Products	Inorganic Chemicals															
	Organic Chemicals															
	Pharmaceuticals															
	Soaps and Detergents															
	Pesticides															
	Adhesives & Sealants															
Petroleum Refining																
Tire and Inner Tube																
Rubber Processing																
Glass Manufacturing																
Iron and Steel																
Foundries -non-ferrous																
Non-ferrous Metals	Primary Non-ferrous															
	Secondary Non-ferrous															
	Copper forming															
	Aluminum forming															
	Non-ferrous forming															
Primary metal products																

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons

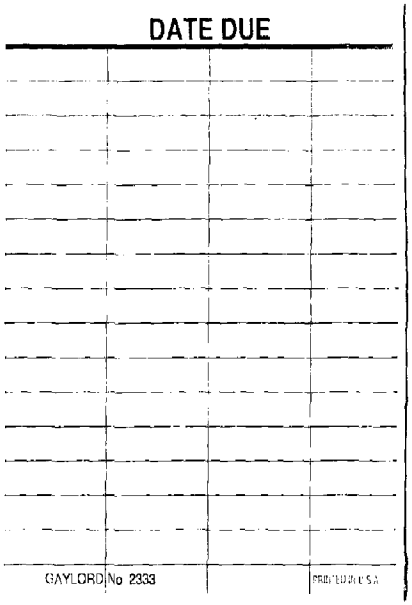
Table 16 continued. Toxic Pollutant Point Source Discharges to Gardiners Bay - circa 1982 (1)

DRAFT 11/87

Industrial Category	Industrial Subcategory	No. Majors	No. Minors	Annual Flow	Zn	Cu	Fe	Total (Zn, Cu, Fe)	As		Cr	Pb	Total (As, Cd, Cr, Pb)	Hg	Pet. HC	CHP
Fabricated metal prod.	Cans															
	Hardware, plumbing															
	Structural															
	Screw machine products															
	Metal forgings & stampings															
	Plating & polishing															
	Coil coating															
	Ordnance															
	Miscellaneous															
Machinery	Machinery, general															
Electric & Electronic	Power transformers															
	Distributing & Industrial															
	Lighting & Wiring															
	Electronic Components															
	Miscellaneous															
Transportation	Motor vehicles, aircraft															
	Shipbuilding & repairing															
	Railroad, miscellaneous															
Misc. Manufacturing	Instruments															
	Jewelry, Silver, Musical															
	Toys, Costume jewelry															
TOTAL INDUSTRY																
Steam Electric																
Petroleum bulk stations																
Sewerage systems	Publicly-owned	0	4	3.92E+08	0	0	2	2	0	0	0	0	0	1	24	0
	Privately-owned															
CSO's																
Upstream Source																
TOTAL ALL SOURCES EXCEPT UPSTREAM		0	4	3.92E+08	0	0	2	2	0	0	0	0	0	1	24	0

Abbreviations: Zinc, Zn; Copper, Cu; Iron, Fe; Arsenic, As; Cadmium, Cd; Chromium, Cr; Lead,Pb; Mercury, Hg; Petroleum Hydrocarbons, Pet. HC; Chlorinated Hydrocarbons, CHP
Products, Prod; Miscellaneous, Misc; Combined sewer overflows, CSO's

(1) Units are in billion gallons/day for annual flow; pounds/year for mercury; tons/year for all other metals and petroleum and chlorinated hydrocarbons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